Private Plan Change Request – Hughes Developments Limited
Appendix D – Geotechnical Assessment

23 October 2020

Hughes Developments Ltd
Christchurch

Attn: Kelvin Back

RE: Geotechnical Summary Letter - Faringdon Far West, Rolleston, Christchurch
(Our Reference: 12903.000.000_103)

1 Introduction

ENGEO Ltd was requested by Hughes Developments Ltd to provide a geotechnical summary letter for the property at Faringdon Far West, Rolleston, Christchurch. The purpose of the letter is to support several geotechnical reports previously completed by ENGEO. This document should be considered supplementary to the reports outlined below and the full reports should be consulted for further detail.

2 Site Description

We understand that the Faringdon Far West development is the area bordered by East Maddisons Road, Selwyn Road and Goulds Road, southwest of the existing Faringdon Development. The approximate site location is shown in Appendix 1 of this report. ENGEO has previously completed the following geotechnical reports within this site:

- 597 East Maddisons Road dated 3 September 2020.
- 92 Dunns Crossing Road dated 13 December 2020.
- 108 Dunns Crossing Road dated 8 November 2019.
- 3/144 Dunns Crossing Road dated 14 August 2020.

3 Geotechnical Investigation Summary

Our geotechnical investigations comprised of machine excavated test pits and hand augers with associated Scala penetrometer tests. The investigations revealed subsurface conditions across the site are consistent with the published geological mapping. Broadly, the subsurface conditions were topsoil overlying sandy gravel. In some testing locations, silt and sand deposits were encountered that are inferred to be in filled paleo channels where they have not remained as channel features.

Based on surrounding ECan boreholes, groundwater was typically recorded at over 5 m deep and up to approximately 10 m deep.

In none of the subsurface investigations completed to date or ECan boreholes reviewed, did we encounter any ground conditions inconsistent with the rest of the site. Therefore, based on the scope of testing completed to date, we consider that the site can be assessed as a large block with no specific areas of concern.

4 Geotechnical Recommendations Summary

Based on our site investigation and observations, and owing to the nature of the subsurface materials and depth to groundwater at the site, we consider the potential for liquefaction and lateral spreading on the site to be very low.

We therefore consider the site of the proposed subdivision to have Technical Category 1 (TC1) future land performance whereby future land damage from liquefaction unlikely, and ground settlements are expected to be within normally accepted tolerances.

Site specific testing will be required for Building Consent, to confirm the bearing materials and bearing capacity. For preliminary design, we anticipate that a geotechnical Ultimate Bearing Capacity of 300 kPa may be assumed for foundations bearing on native sandy gravel or engineered fill, below any topsoil. All topsoil shall be stripped from within building footprints.

5 Limitations

i. We have prepared this report in accordance with the brief as provided. This report has been prepared for the use of our client, Hughes Developments Ltd, their professional advisers and the relevant Territorial Authorities in relation to the specified project brief described in this report. No liability is accepted for the use of any part of the report for any other purpose or by any other person or entity.

ii. The recommendations in this report are based on the ground conditions indicated from published sources, site assessments and subsurface investigations described in this report based on accepted normal methods of site investigations. Only a limited amount of information has been collected to meet the specific financial and technical requirements of the Client's brief and this report does not purport to completely describe all the site characteristics and properties. The nature and continuity of the ground between test locations has been inferred using experience and judgement and it should be appreciated that actual conditions could vary from the assumed model.

iii. Subsurface conditions relevant to construction works should be assessed by contractors who can make their own interpretation of the factual data provided. They should perform any additional tests as necessary for their own purposes.

iv. This Limitation should be read in conjunction with the Engineering NZ / ACENZ Standard Terms of Engagement.

v. This report is not to be reproduced either wholly or in part without our prior written permission.

We trust that this information meets your current requirements. Please do not hesitate to contact the undersigned on (03) 328 9012 if you require any further information.

Report prepared by

Jed Watts

Engineering Geologist

Report reviewed by

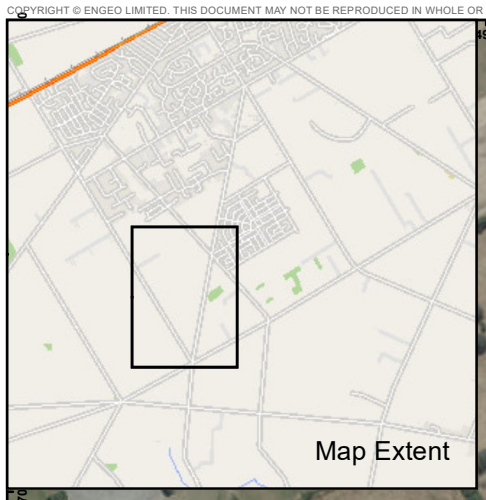
Greg Martin, CMEngNZ (PEngGeol)

Principal Engineering Geologist

Attachments:

- *Site plan*

DATE PLOTTED: 23 October 2020 9:22:49 am BY: NFlatman



3/144
Dunns Crossing Road

597
East Maddisons Road

108
Dunns Crossing Road

92
Dunns Crossing Road

N

Legend

Site boundary

Aerial: LINZ and Eagle Technology, CC BY 4.0.
Map image: Eagle Technology.

0 50 100
Metres

PROJECTION: NZGD 2000 New Zealand Transverse Mercator

PATH: Z:\Projects\12901 to 13000\12903 - Faringdon South Subdivision\102_Far West\01_GIS\Fig01.mxd

ENGEO

Tauranga Office
1/314 Maunganui Road
Mount Maunganui
Tauranga 3116
Tel: 07 777 0209
www.engeo.co.nz

Title: Site location plan

Client: Hughes Developments

Project: Faringdon Far West

Designed: NF
Drawn: NF
Checked: DRAFT
Date: Oct 20

Proj No: 12903.000.000

Scale: 1:5,000

Figure No: 1

Size: A3

Revision: A

ORIGINAL FIGURE PRINTED IN COLOUR

ENGEO

Expect Excellence

Geotechnical Investigation

3/144 Dunns Crossing Road

Rolleston

Christchurch

Submitted to:

Hughes Developments Ltd

Christchurch

ENGEO Limited
124 Montreal Street, Sydenham, Christchurch 8023
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Tel +64 3 328 9012 Fax +64 3 328 9013
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14.08.2020
12903.001.000_91

ACENZ

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ENGEO Document Control:

Report Title	Geotechnical Investigation - 3/144 Dunns Crossing Road, Rolleston			
Project No.	12903.001.000	Doc ID	91	
Client	Hughes Developments Ltd	Client Contact	Kelvin Back	
Distribution (PDF)	Kelvin Back			
Date	Revision Details/Status	WP	Author	Reviewer
14/08/2020	Issued to Client	JT	JRW	GM

1 Introduction

ENGEO Ltd was requested by Hughes Developments Ltd to undertake a geotechnical investigation of the property at 3/144 Dunns Crossing Road, Rolleston, Christchurch, as outlined in our variation proposal (ref: P2020.004.581_01).

The purpose of this assessment was to conceptualise a geological model of the site, assess the likely future land performance, comment on the suitability of the site for residential subdivision, address the requirements of Section 106 of the Resource Management Act (RMA) and provide recommendations for subdivision works and foundations for typical timber framed residential dwellings.

Our scope of works included the following:

- Complete a desktop study of relevant available geotechnical and geological publications, including the NZ Geotechnical and Environment Canterbury Databases;
- Undertake a geotechnical site walkover;
- Undertake five hand auger boreholes with associated Scala penetrometer tests to assess the near surface material types and strength characteristics;
- Organise and technically supervise the excavation of six test pits, including geotechnical logging of the exposed soils; and
- Preparation of this report outlining our findings on the ground conditions and the suitability of the site for residential subdivision, including geotechnical advice on the likely foundation Technical Category, conceptual foundation recommendations for typical timber framed residential dwellings, and address likely geohazards as required by Section 106 of the RMA.

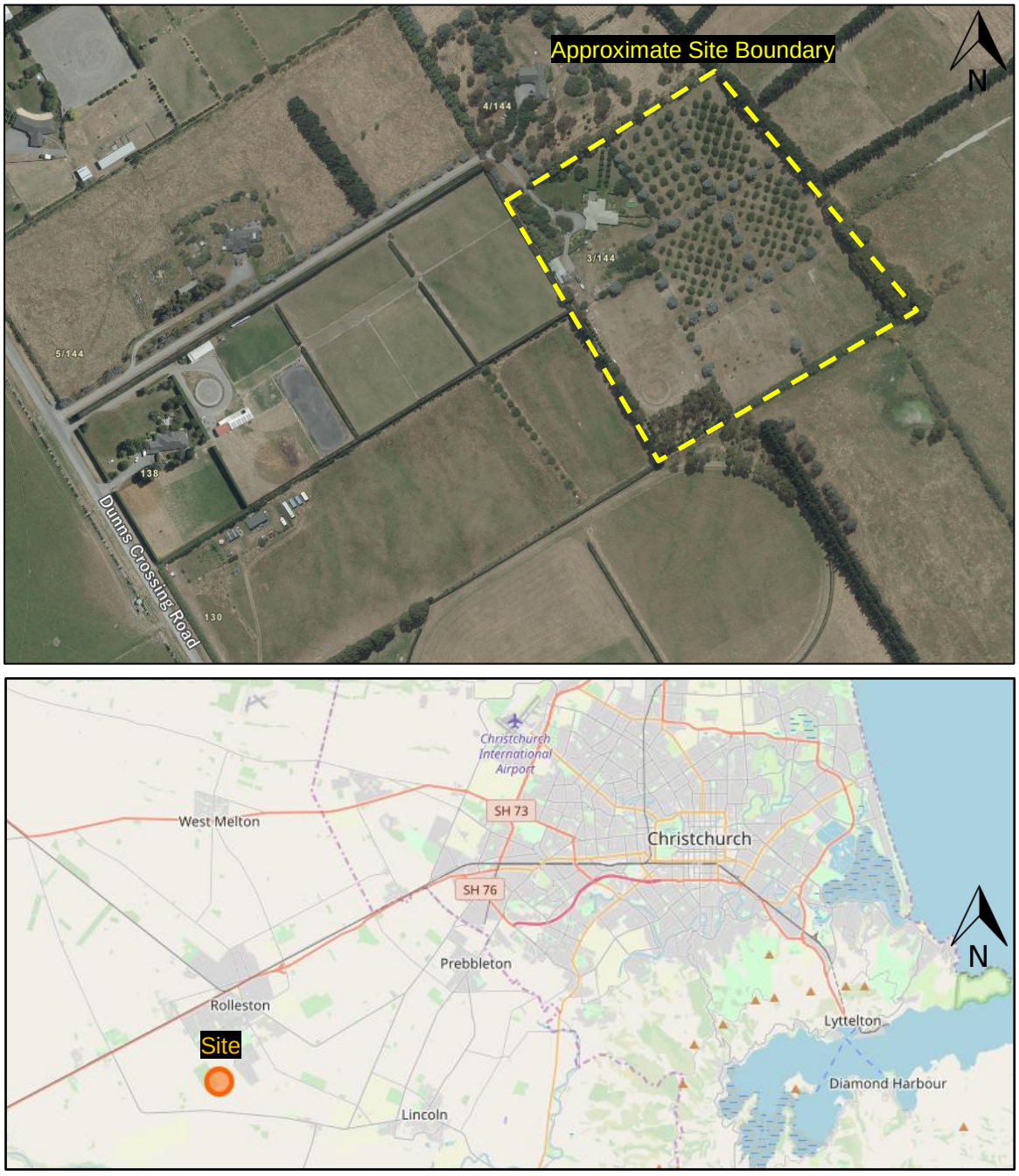
2 Site Description

The site comprises of one property with a total area of four hectares and the following legal description (Canterbury Maps):

- Lot 3 DP 70352 BLK III

The site is located approximately 3 km southwest of Rolleston town centre and is bound on all sides by rural properties (Figure 1).

Figure 1: Site Location Plan



Images sourced from Canterbury Maps and "© OpenStreetMap contributors". Not to scale.

3 Geological Model

3.1 Regional Geology

The site has been regionally mapped by GNS (Forsyth et al., 2008) as being underlain by brownish grey river alluvium (Q2a).

3.2 Geomorphology

The site comprises relatively flat ground, with gentle undulations and depressions in some areas. As evident on aerial imagery (Canterbury Maps, 2019) and observed during our site walkover conducted on 5 August 2020, undulating and depressed ground can be attributed to paleo-channels, which traverse the site in a general northwest to southeast direction (Figure 2). Based on observations, sandy silt deposits with variable thickness are expected to have in-filled the paleo-channels where they have not remained as channel features. Inferred paleo-channels have been mapped to give an indication of areas with potential channel in-fill (Appendix 1).

Figure 2: Historical Aerial Photo – 1990 - 1994

Image sourced from Canterbury Maps. Not to scale.

3.3 Geohazards

3.3.1 Seismicity

There are no known or mapped faults in the immediate area of the site, however the site may be at risk of ground shaking induced by movement of proximal or distal faults.

The site is located between two recently discovered fault systems, the Greendale Fault and the Port Hills Fault, the ruptures of which initiated the ongoing Canterbury Earthquake Sequence (CES). The Greendale Fault has been mapped approximately 6 km north / northwest of the site and trends roughly east-west with a surface rupture length of approximately 28 km (GNS, 2015), while the Port Hills Fault remains unmapped as the fault did not rupture at the surface. Movement on the Port Hills Fault is believed to have extended to within 1 km to 2 km below ground surface.

Large regional areas of faulting (GNS, 2015) namely the Ashley Fault, Porters Pass - Amberley Fault Zone, and the Hope and Alpine Faults, are further afield but present a high seismic hazard to the Christchurch area due to the anticipated size of earthquakes generated. The largest of these faults is the Alpine Fault, which has a return period of 250 - 300 years and is expected to produce a M8 earthquake. The last rupture on the Alpine Fault is believed to have occurred in 1717 (Pettinga et al., 2001).

3.3.2 Liquefaction and Lateral Spreading

The site is located in an area mapped where “damaging liquefaction is unlikely” (NZGD Map CGD5140, 2012), and a “zone of very low liquefaction potential” (GNS, 2006).

3.4 Site Investigation

Site investigations to assess the shallow subsurface material types and strength characteristics were undertaken by ENGEO on 7 August 2020. Six test pits and five hand auger investigations with associated Scala Penetrometer tests were completed to a maximum depth of 2.3 m below ground level.

The investigations revealed subsurface conditions across the site are consistent with the published geological mapping, as summarised in Table 1. Hand auger and test pit logs are attached as Appendix 2 of this report.

Table 1: Summary of Subsurface Investigations

Soil Type	Depth to Top of Layer (m)	General Layer Thickness (m)	Density / Consistency	Additional Comments
TOPSOIL	0.0	0.1 – 0.3	Stiff to Very Stiff	-
Sandy GRAVEL	0.3	Unknown	Medium Dense to Very Dense	Tightly packed and consistent across the site. A thin lens of loosely packed fine to medium gravel was encountered at approximately 1 m depth across the test pit locations.

3.5 ECan Boreholes

A review of six deep ECan borehole logs was conducted. The first (M36/4449 & M36/4387), are located on-site, and appear to be water wells providing the properties irrigation and domestic supply. The other boreholes are located to the north (M36/4450), east (M36/20535), south (BX23/0895) and west (M36/7416) of the site.

Well logs from the six holes of interest are attached to this report as Appendix 3 and summarised in Table 2.

Table 2: Generalised Summary of ECan Boreholes

ECan Borehole	Total Depth (m)	Water Level Below Ground Level (m)	Generalised Borelog as Logged by Driller
M36/5041	34	9.73	Gravel with silt and sand to 34 m depth.
M36/0016	15.2	9.85	Sandy gravel to 15.2 m depth.
M36/5042	32.5	9.97	Sandy gravel to 32.5 m depth.
M36/5038	32	9.58	Sandy gravel to 32 m depth.

Figure 3: Nearby ECan Borehole Locations

Aerial photograph sourced from Canterbury Maps. Not to scale.

3.6 Groundwater

Groundwater is recorded in the surrounding boreholes between approximately 9 to 10 m depth.

3.7 Site Seismic Class

In accordance with NZS 1170.5:2004, Class D applies to this particular site, defining it as a 'deep soft soil site'.

4 Liquefaction Analysis

Owing to the nature of the subsurface materials and depth to groundwater at the site, we consider the potential for liquefaction and lateral spreading on the site to be very low.

We therefore consider future land performance to be in line with Technical Category 1 (TC1), whereby future land damage from liquefaction is unlikely, and ground settlements are expected to be within normally accepted tolerances.

5 RMA Section 106 Requirements and Suitability to Subdivide

Section 106 of the Resource Management Act 1991 states a consent authority may refuse to grant a subdivision consent, or may grant a consent subject to specific consent conditions if it considers that:

- There is a significant risk from natural hazards; or
- Sufficient provision has not been made for legal or physical access to each allotment to be created by the subdivision.

An assessment of the risk from natural hazards as required by the RMA includes the following:

- The likelihood of natural hazards occurring (whether individually or in combination);
- The material damage to land in respect of which the consent is sought, other land, or structures that would result from natural hazards; and
- Any likely subsequent use of the land in respect of which the consent is sought that would accelerate, worsen, or result in material damage of the kind referred to in paragraph (b).

We have assessed the risk of natural hazards at the site in accordance with Section 106 of the Resource Management Act (RMA) and considered the risk to the site from rockfall, inundation (debris), slope stability, subsidence, flooding and tsunami. Based on our observations and the nature of the site, its performance during the CES, and the site's distance from the nearest significant watercourse, we consider it is unlikely for the site to be subject to natural hazards such as rockfall, inundation (debris), slope stability, subsidence, flooding and tsunami. As such, the site is considered suitable for subdivision from a geotechnical perspective.

6 Geotechnical Recommendations

6.1 Earthworks

Earthworks carried out for the subdivision shall be in accordance with NZS 4404:2010, Land Development and Subdivision Infrastructure and NZS 4431:1989, Code of Practice for Earth filling for Residential Development. In particular, any areas to receive fill should be stripped of all vegetation, topsoil, non-engineered fill, soft or organic soils prior to fill placement.

Fill may comprise clean natural sandy gravel or silty soils, or clean imported soils and / or granular fill, compacted to achieve no less than 95% of maximum dry density. Fill faces steeper than 2V:1H and higher than 600 mm should be retained and referred back to ENGEO. Although unlikely, where any springs or groundwater seeps are encountered, they should be intercepted with suitable drainage and discharged to a Council approved outlet.

All unretained batters of pond and stormwater drains constructed with the native sandy gravel material should be at an inclination no steeper than 1V:3H, with protection schemes in place to control erosion of the formed batters within the waterways.

A comprehensive earthworks specification should be provided to the earthworks contractor prior to starting excavations and an inspection / testing regime agreed, along with a robust erosion and sediment control plan.

6.2 Subdivision Roading

Vegetation, any organic or deleterious material, topsoil and non-engineered fill should be removed from the site under pavement areas prior to aggregate placement. Based on our observations during testing, we consider the natural ground below the topsoil at the site should provide an adequate subgrade for the proposed pavement areas.

6.3 Stormwater Control

Concentrated stormwater flows from all impermeable areas must be collected and carried in sealed pipes to the Council system or an alternative disposal point subject to approval from Council. Uncontrolled stormwater must not be allowed to saturate the ground as this will potentially affect future foundation performance both statically and during future seismic activity.

6.4 Foundations

Foundations for future proposed residential dwellings within the subdivision may comprise shallow pad, strip, or slab foundations designed in accordance with the provisions of NZS 3604 Timber Framed Buildings.

Site specific testing will be required for Building Consent, to confirm the bearing materials and capacity. For preliminary design, we anticipate that a geotechnical Ultimate Bearing Capacity of 300 kPa may be assumed for foundations bearing on sandy gravel or engineered fill, below any topsoil. All topsoil shall be stripped from within building footprints, we anticipate this to be typically below 0.3 m depth based on our subsurface investigations.

7 References

Canterbury Maps, Groundwater. Retrieved August 2020, from http://canterburymaps.govt.nz/Viewer.

Canterbury Maps, Historic Aerial Imagery. Retrieved August 2020, from https://apps.canterburymaps.govt.nz/CanterburyHistoricAerialImagery.

Forsyth, P., Barrell, D. J., & Jongens, R. (2008). Sheet 16 - Geology of the Christchurch Area 1:250,000. Lower Hutt: Institute of Geological and Nuclear Sciences.

GNS Science (2015). New Zealand Active Faults Database. Retrieved August 2020, from http://data.gns.cri.nz /af.

Pettinga J.R., Yetton M.D., Van Dissen R.J., & Downes G. (2001). Earthquake Source Identification and Characterisation for the Canterbury Region, South Island, New Zealand. Bulletin of the New Zealand Society for Earthquake Engineering, Vol 34, No. 4, pp 282-317.

Selwyn District Council, Property Search, retrieved August 2020, from https://www.selwyn.govt.nz/my-property/rates/search-properties.

Standards Association of New Zealand (1989). NZS 4431:1989. Code of Practice for Earthfilling for Residential Development.

Standards Association of New Zealand (2004). NZS 1170.5:2004. Structural Design Actions Part 5: Earthquake Actions – New Zealand.

Standards Association of New Zealand (2010). NZS 3604:2010. Timber Framed Buildings.

Standards Association of New Zealand (2010). NZS 4404:2010. Land Development and Subdivision Infrastructure.

The Ministry of Business, Innovation, and Employment (2016). New Zealand Geotechnical Database. Retrieved August 2020, from https://www.nzgd.org.nz.

8 Limitations

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We trust that this information meets your current requirements. Please do not hesitate to contact the undersigned on (03) 328 9012 if you require any further information.

Report prepared by

Jed Watts

Engineering Geologist

Report reviewed by

Greg Martin, CMEngNZ (PEngGeol)

Principal Engineering Geologist

APPENDIX 1:

Site Plan and Inferred Paleo Channels

ENGEO
Tauranga Office
1/314 Maunganui Road
Mount Maunganui, Tauranga 3116
Tel: 07 777 0209, www.engeo.co.nz

Title: Geotechnical Site Plan

Aerial: LINZ and Eagle Technology, CC BY 4.0.
Map image: Eagle Technology.

PROJECTION: NZGD 2000 New Zealand Transverse Mercator

Client: Hughes Developments Ltd		Figure No: 1
Project: 3/144 Dunns Crossing Road Rolleston	Designed: NF Drawn: JW Checked: GM Date: Aug 20	Size: A4
Proj No: 12903.000.003	Scale: 1:2,000	Revision: A

ORIGINAL FIGURE PRINTED IN COLOUR

APPENDIX 2:

ENGEO Hand Auger and Test Pit Logs

LOG OF AUGER HA01

Geotechnical Investigation
3/144 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 07/08/2020
Hole Depth : 0.4 m
Hole Diameter : mm

Shear Vane No : N/A
Logged By : JC
Reviewed By : JW
Latitude : 172.3744
Longitude : -43.62188

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TS	ML	Sandy SILT with trace rootlets and gravel; brown. Low plasticity. Sand, fine to medium. Gravel, fine to coarse, subrounded to subangular [TOPSOIL].				D	F-St	
	A	GW	Sandy fine to coarse GRAVEL; brownish grey. Well graded, subangular to subrounded. Sand, fine to coarse.					D	
0.5			End of Hole Depth: 0.4 m Termination Condition: Target depth						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.4 m.
Scala Penetrometer met target depth at 0.5 m.
Standing groundwater was not encountered.
TS = TOPSOIL

A = ALLUVIUM

GEOTECH HAND AUGER 2020.08.07 - 3-144 DUNNS CROSSING ROAD.GPJ NZ DATA TEMPLATE 2.GDT 11/8/20

LOG OF AUGER HA02

Geotechnical Investigation
3/144 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 07/08/2020
Hole Depth : 0.35 m
Hole Diameter : mm

Shear Vane No : N/A
Logged By : JC
Reviewed By : JW
Latitude : 172.37531
Longitude : -43.62104

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TS	ML	Sandy SILT with trace rootlets and gravel; brown. Low plasticity. Sand, fine to medium. Gravel, fine to coarse, subrounded to subangular [TOPSOIL].				D	F-St	
	A	GW	Sandy fine to coarse GRAVEL; brownish grey. Well graded, subangular to subrounded. Sand, fine to coarse.						
0.5			End of Hole Depth: 0.35 m Termination Condition: Target depth						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.35 m.
Scala Penetrometer met target depth at 0.5 m.
Standing groundwater was not encountered.
TS = TOPSOIL

A = ALLUVIUM

GEOTECH HAND AUGER 2020.08.07 - 3-144 DUNNS CROSSING ROAD.GPJ NZ DATA TEMPLATE 2.GDT 11/8/20

LOG OF AUGER HA03

Geotechnical Investigation
3/144 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 07/08/2020
Hole Depth : 0.3 m
Hole Diameter : mm

Shear Vane No : N/A
Logged By : JC
Reviewed By : JW
Latitude : 172.37435
Longitude : -43.62136

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TS	ML	Sandy SILT with trace rootlets and gravel; brown. Low plasticity. Sand, fine to medium. Gravel, fine to coarse, subrounded to subangular [TOPSOIL].				D	F-St	
	A	GW	Sandy fine to coarse GRAVEL; brownish grey. Well graded, subangular to subrounded. Sand, fine to coarse.					MD	
0.5			End of Hole Depth: 0.3 m Termination Condition: Target depth						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.3 m.
Scala Penetrometer met target depth at 0.5 m.
Standing groundwater was not encountered.
TS = TOPSOIL

A = ALLUVIUM

GEOTECH HAND AUGER 2020.08.07 - 3-144 DUNNS CROSSING ROAD.GPJ NZ DATA TEMPLATE 2.GDT 11/8/20

LOG OF AUGER HA04

Geotechnical Investigation
3/144 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 07/08/2020
Hole Depth : 0.35 m
Hole Diameter : mm

Shear Vane No : N/A
Logged By : JC
Reviewed By : JW
Latitude : 172.3746
Longitude : -43.62035

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TS	ML	Sandy SILT with trace rootlets and gravel; brown. Low plasticity. Sand, fine to medium. Gravel, fine to coarse, subrounded to subangular [TOPSOIL].				D	F-St	
	A	GW	Sandy fine to coarse GRAVEL; brownish grey. Well graded, subangular to subrounded. Sand, fine to coarse.					MD	
0.5			End of Hole Depth: 0.35 m Termination Condition: Target depth						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.35 m.
Scala Penetrometer met target depth at 0.6 m.
Standing groundwater was not encountered.
TS = TOPSOIL

A = ALLUVIUM

GEOTECH HAND AUGER 2020.08.07 - 3-144 DUNNS CROSSING ROAD.GPJ NZ DATA TEMPLATE 2.GDT 11/8/20

LOG OF AUGER HA05

Geotechnical Investigation
3/144 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 07/08/2020
Hole Depth : 0.3 m
Hole Diameter : mm

Shear Vane No : N/A
Logged By : JC
Reviewed By : JW
Latitude : 172.37354
Longitude : -43.62115

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TS	ML	Sandy SILT with trace rootlets and gravel; brown. Low plasticity. Sand, fine to medium. Gravel, fine to coarse, subrounded to subangular [TOPSOIL].				D	F-St	
0.5	ALLUVIUM	GW	Sandy fine to coarse GRAVEL; brownish grey. Well graded, subangular to subrounded. Sand, fine to coarse.					MD-D	
			End of Hole Depth: 0.3 m Termination Condition: Target depth						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.3 m.
Scala Penetrometer met target depth at 0.3 m.
Standing groundwater was not encountered.
TS = TOPSOIL

A = ALLUVIUM

GEOTECH HAND AUGER 2020.08.07 - 3-144 DUNNS CROSSING ROAD.GPJ NZ DATA TEMPLATE 2.GDT 11/8/20

LOG OF TEST PIT TP01

Geotechnical Investigation
3/144 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 07/08/2020
Max Test Pit Depth : 2.3 m
Digger Type/Size : 24 Tonne
Bucket Type/Size : Bucket Excavator

Shear Vane No : N/A
Logged By : JC
Reviewed By : JW
Latitude : 172.37377
Longitude : -43.62161

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier – Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
0	TS		ML	Sandy SILT with minor gravel and rootlets; brown. Low plasticity. Sand, fine to coarse. Gravel, fine to coarse, subrounded to subangular [TOPSOIL].					St-VSt		
0.5	ALLUVIUM			Sandy fine to coarse GRAVEL with minor cobbles; brownish grey. Well graded, subangular to subrounded. Sand, fine to coarse. Trace silt encountered from 0.3 to 0.5 m depth.				D			
1.0			GW	150 mm lens of loosely packed fine to medium gravel encountered at 1 m depth.					Tightly Packed		
1.5								M			
2.0											
2.5				Depth of Excavation: 2.3 m Termination Condition: Target depth							

Test pit met target depth.

Standing groundwater was not encountered.

TS = TOPSOIL

GEOTECH TEST PIT LOG 2020.08.07 - 3-144 DUNNS CROSSING ROAD.GPJ NZ MASTER DATA TEMPLATE.GDT 13/8/20

LOG OF TEST PIT TP02

Geotechnical Investigation
3/144 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 07/08/2020
Max Test Pit Depth : 2 m
Digger Type/Size : 24 Tonne
Bucket Type/Size : Bucket Excavator

Shear Vane No : N/A
Logged By : JC
Reviewed By : JW
Latitude : 172.37494
Longitude : -43.62163

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier – Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
0	TS		ML	Sandy SILT with minor gravel and rootlets; brown. Low plasticity. Sand, fine to coarse. Gravel, fine to medium, subrounded to subangular [TOPSOIL].					St-VSt		
0.5	ALLUVIUM		GW	Sandy fine to coarse GRAVEL with minor cobbles; brownish grey. Well graded, subangular to subrounded. Sand, fine to coarse.				D	Tightly Packed		
1.0			SW	Gravelly fine to coarse SAND; grey. Well graded. Gravel, fine to coarse.					MD-D		
			GW	Sandy fine to coarse GRAVEL with minor cobbles; brownish grey. Well graded, subangular to subrounded. Sand, fine to coarse. 100 mm to 150 mm lens of loosely packed fine to medium gravel encountered at 1 m depth.				M	Tightly Packed		
1.5											
2.0				Depth of Excavation: 2 m Termination Condition: Target depth							
2.5											

Test pit met target depth.

Standing groundwater was not encountered.

TS = TOPSOIL

GEOTECH TEST PIT LOG 2020.08.07 - 3-144 DUNNS CROSSING ROAD.GPJ NZ MASTER DATA TEMPLATE.GDT 13/8/20

LOG OF TEST PIT TP03

Geotechnical Investigation
3/144 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 07/08/2020
Max Test Pit Depth : 2.1 m
Digger Type/Size : 24 Tonne
Bucket Type/Size : Bucket Excavator

Shear Vane No : N/A
Logged By : JC
Reviewed By : JW
Latitude : 172.37575
Longitude : -43.62133

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier – Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
0.0	TS		ML	Sandy SILT with minor gravel and rootlets; brown. Low plasticity. Sand, fine to coarse. Gravel, fine to coarse, subrounded to subangular [TOPSOIL].				D	St-VSt		
0.5	ALLUVIUM		GW	Sandy fine to coarse GRAVEL with minor cobbles; brownish grey. Well graded, subangular to subrounded. Sand, fine to coarse. Trace silt encountered from 0.3 to 0.5 m depth.				M	Tightly packed		
1.0				100 mm lens of loosely packed fine to medium gravel encountered at 1.2 m depth.							
1.5											
2.0				Depth of Excavation: 2.1 m Termination Condition: Target depth							
2.5											

Test pit met target depth.

Standing groundwater was not encountered.

TS = TOPSOIL

LOG OF TEST PIT TP04

Geotechnical Investigation
3/144 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 07/08/2020
Max Test Pit Depth : 2.3 m
Digger Type/Size : 24 Tonne
Bucket Type/Size : Bucket Excavator

Shear Vane No : N/A
Logged By : JC
Reviewed By : JW
Latitude : 172.37497
Longitude : -43.62056

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier – Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
0	TS		ML	Sandy SILT with some gravel and trace rootlets; brown. Low plasticity. Sand, fine to medium. Gravel, fine to coarse, subrounded to subangular [TOPSOIL].				D	St-VSt		
0.5	ALLUVIUM			Sandy fine to coarse GRAVEL with minor cobbles; brownish grey. Well graded, subangular to subrounded. Sand, fine to coarse. Rootlets encountered up to 0.6 m depth.							
1.0			GW	<100 mm lens of loosely packed fine to medium gravel encountered at 1.2 m depth.				M	Tightly Packed		
1.5											
2.0											
2.5				Depth of Excavation: 2.3 m Termination Condition: Target depth							

Test pit met target depth.

Standing groundwater was not encountered.

TS = TOPSOIL

LOG OF TEST PIT TP05

Geotechnical Investigation
3/144 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 07/08/2020
Max Test Pit Depth : 2 m
Digger Type/Size : 24 Tonne
Bucket Type/Size : Bucket Excavator

Shear Vane No : N/A
Logged By : JC
Reviewed By : JW
Latitude : 172.37453
Longitude : -43.62077

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier – Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
0.0	TS		ML	Sandy SILT with some gravel and trace rootlets; brown. Low plasticity. Sand, fine to medium. Gravel, fine to coarse, subrounded to subangular [TOPSOIL].				D	St-VSt		
0.5	ALLUVIUM		GW	Sandy fine to coarse GRAVEL with minor cobbles; brownish grey. Well graded, subangular to subrounded. Sand, fine to coarse. Trace silt encountered from 0.3 to 0.6 m depth. 200 to 300 mm lens of loosely packed fine to medium gravel encountered at 0.7 m depth.				M	Tightly Packed		
1.0											
1.5											
2.0				Depth of Excavation: 2 m Termination Condition: Target depth							
2.5											

Test pit met target depth.

Standing groundwater was not encountered.

TS = TOPSOIL

LOG OF TEST PIT TP06

Geotechnical Investigation
3/144 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 07/08/2020
Max Test Pit Depth : 2 m
Digger Type/Size : 24 Tonne
Bucket Type/Size : Bucket Excavator

Shear Vane No : N/A
Logged By : JC
Reviewed By : JW
Latitude : 172.37404
Longitude : -43.62051

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier – Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
0	TS		ML	Sandy SILT with some gravel and trace rootlets; brown. Low plasticity. Sand, fine to medium. Gravel, fine to coarse, subrounded to subangular [TOPSOIL].				D	St-VSt		
0.5	ALLUVIUM		GW	Sandy fine to coarse GRAVEL with minor cobbles; brownish grey. Well graded, subangular to subrounded. Sand, fine to coarse. Trace silt encountered from 0.3 to 0.6 m depth.				M	Tightly Packed		
1.0				100 mm lens of loosely packed fine to medium gravel encountered at 1.3 m depth.							
1.5											
2.0				Depth of Excavation: 2 m Termination Condition: Target depth							
2.5											

Test pit met target depth.

Standing groundwater was not encountered.

TS = TOPSOIL

APPENDIX 3:

ECan Borelogs

Bore or Well No	M36/5041
Well Name	DUNNS CROSSING ROAD
Owner	KAJENS TRADING DEVELOPMENT LTD

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

Well Number	M36/5041	**File Number**	CO6C/10302
Owner	KAJENS TRADING DEVELOPMENT LTD	**Well Status**	Active (exist, present)
Street/Road	DUNNS CROSSING ROAD	**NZTM Grid Reference**	BX23:49507-69990
Locality	ROLLESTON	**NZTM X and Y**	1549507 - 5169990
Location Description		**Location Accuracy**	50 - 300m
CWMS Zone	Selwyn - Waihora	**Use**	Domestic Supply,
Groundwater Allocation Zone	Selwyn-Waimakariri	**Water Level Monitoring**	--
Depth	32.00m	**Water Level Count**	0
Diameter	150mm	**Initial Water Level**	6.80m below MP
Measuring Point Description		**Highest Water Level**	
Measuring Point Elevation	40.47m above MSL (Lyttelton 1937)	**Lowest Water Level**	
Elevation Accuracy	< 2.5 m	**First reading**	
Ground Level	0.00m above MP	**Last reading**	
Strata Layers	10	**Calc Min 80%**	9.73m below MP (Estimated)
Aquifer Name		**Aquifer Tests**	0
Aquifer Type	Unknown	**Yield Drawdown Tests**	1
Drill Date	01 Feb 1997	**Max Tested Yield**	5 l/s
Driller	Dynes Road Drilling	**Drawdown at Max Tested Yield**	13 m
Drilling Method	Cable Tool	**Specific Capacity**	0.40 l/s/m
Casing Material	STEEL	**Last Updated**	08 Nov 2013
Pump Type	Unknown	**Last Field Check**	
Water Use Data	No		

Screens

Screen No.	Screen Type	Top (m)	Bottom (m)	Slot Size (mm)	Slot Length (mm)	Diameter (mm)	Leader Length (mm)
1	Stainless steel	30	32				

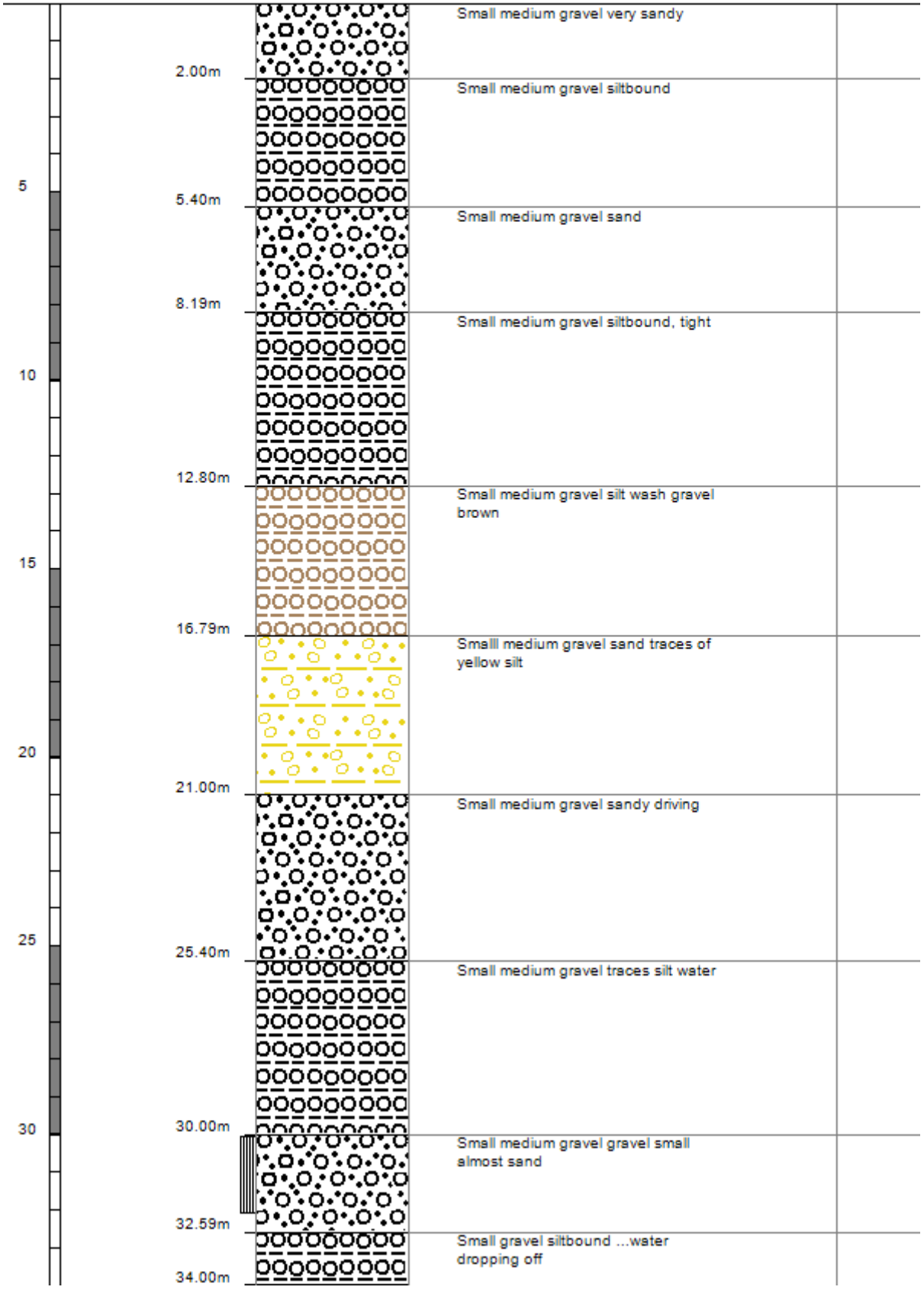
Step Tests

Step Test Date	Step	Yield	Yield GPM	DrawDown	Step Duration
01 Feb 1997	1	5.1	67.31074	12.8	2

No comments for this well

Borelog for well M36/5041

Grid Reference (NZTM): 1549508 mE, 5169991 mN
Location Accuracy: 50 - 300m
Ground Level Altitude: 40.5 m +MSD Accuracy: < 2.5 m
Driller: Dynes Road Drilling
Drill Method: Cable Tool
Borelog Depth: 34.0 m Drill Date: 01-Feb-1997



Bore or Well No	M36/0016
Well Name	Goulds Road
Owner	WADE.A.

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

Well Number	M36/0016	**File Number**	
Owner	WADE.A.	**Well Status**	Not Used
Street/Road	Goulds Road	**NZTM Grid Reference**	BX23:49707-70190
Locality	ROLLESTON	**NZTM X and Y**	1549707 - 5170190
Location Description		**Location Accuracy**	50 - 300m
CWMS Zone	Selwyn - Waihora	**Use**	,
Groundwater Allocation Zone	Selwyn-Waimakariri	**Water Level Monitoring**	--
Depth	14.00m	**Water Level Count**	0
Diameter	51mm	**Initial Water Level**	
Measuring Point Description		**Highest Water Level**	
Measuring Point Elevation	40.62m above MSL (Lyttelton 1937)	**Lowest Water Level**	
Elevation Accuracy	< 2.5 m	**First reading**	
Ground Level	0.00m above MP	**Last reading**	
Strata Layers	3	**Calc Min 80%**	9.85m below MP (Estimated)
Aquifer Name		**Aquifer Tests**	0
Aquifer Type	Unknown	**Yield Drawdown Tests**	0
Drill Date	29 Aug 1932	**Max Tested Yield**	
Driller	Pearson	**Drawdown at Max Tested Yield**	
Drilling Method	Unknown	**Specific Capacity**	
Casing Material	STEEL	**Last Updated**	06 Mar 2001
Pump Type	Unknown	**Last Field Check**	
Water Use Data	No		

No screen data for this well

No step tests for this well

No comments for this well

Borelog for well M36/0016

Grid Reference (NZTM): 1549708 mE, 5170191 mN
Location Accuracy: 50 - 300m
Ground Level Altitude: 40.6 m +MSD Accuracy: < 2.5 m
Driller: Pearson
Drill Method: Unknown
Borelog Depth: 15.2 m Drill Date: 29-Aug-1932

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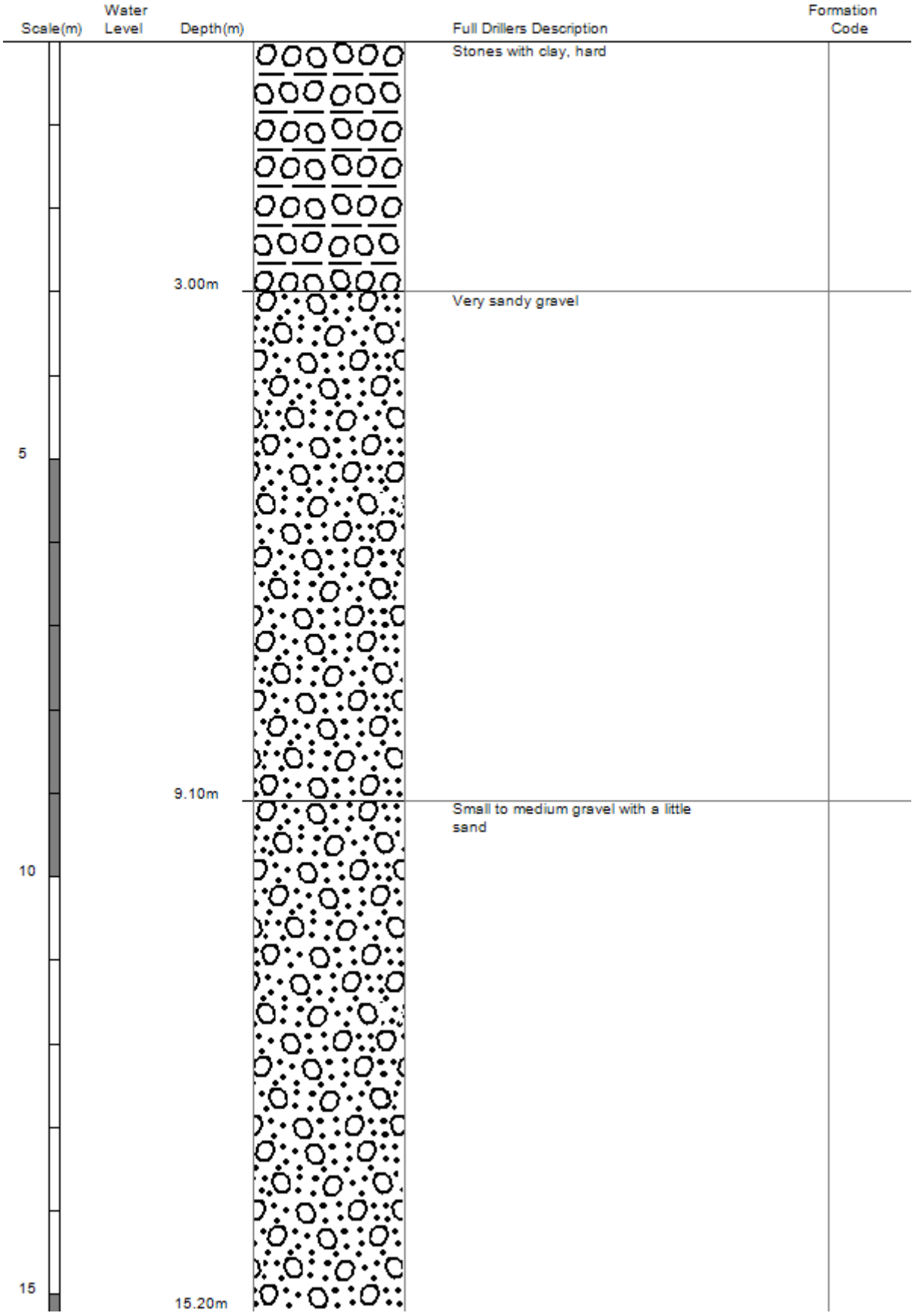

Bore or Well No	M36/5042
Well Name	DUNNS CROSSING ROAD
Owner	KAJENS TRADING DEVELOPMENT LTD

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

Well Number	M36/5042	**File Number**	CO6C/10303
Owner	KAJENS TRADING DEVELOPMENT LTD	**Well Status**	Active (exist, present)
Street/Road	DUNNS CROSSING ROAD	**NZTM Grid Reference**	BX23:49378-70190
Locality	ROLLESTON	**NZTM X and Y**	1549378 - 5170190
Location Description		**Location Accuracy**	50 - 300m
CWMS Zone	Selwyn - Waihora	**Use**	Domestic Supply,
Groundwater Allocation Zone	Selwyn-Waimakariri	**Water Level Monitoring**	--
Depth	32.10m	**Water Level Count**	0
Diameter	150mm	**Initial Water Level**	6.00m below MP
Measuring Point Description		**Highest Water Level**	
Measuring Point Elevation	42.04m above MSL (Lyttelton 1937)	**Lowest Water Level**	
Elevation Accuracy	< 2.5 m	**First reading**	
Ground Level	0.00m above MP	**Last reading**	
Strata Layers	8	**Calc Min 80%**	9.97m below MP (Estimated)
Aquifer Name		**Aquifer Tests**	0
Aquifer Type	Unknown	**Yield Drawdown Tests**	1
Drill Date	01 Nov 1996	**Max Tested Yield**	5 l/s
Driller	Dynes Road Drilling	**Drawdown at Max Tested Yield**	12 m
Drilling Method	Cable Tool	**Specific Capacity**	0.41 l/s/m
Casing Material	STEEL	**Last Updated**	08 Nov 2013
Pump Type	Unknown	**Last Field Check**	
Water Use Data	No		

Screens

Screen No.	Screen Type	Top (m)	Bottom (m)	Slot Size (mm)	Slot Length (mm)	Diameter (mm)	Leader Length (mm)
1	Stainless steel	30.1	32.1				

Step Tests

Step Test Date	Step	Yield	Yield GPM	DrawDown	Step Duration
01 Nov 1996	1	5	65.99092	12.2	2

No comments for this well

Borelog for well M36/5042

Grid Reference (NZTM): 1549378 mE, 5170191 mN
Location Accuracy: 50 - 300m
Ground Level Altitude: 42.0 m +MSD Accuracy: < 2.5 m
Driller: Dynes Road Drilling
Drill Method: Cable Tool
Borelog Depth: 32.5 m Drill Date: 01-Nov-1996

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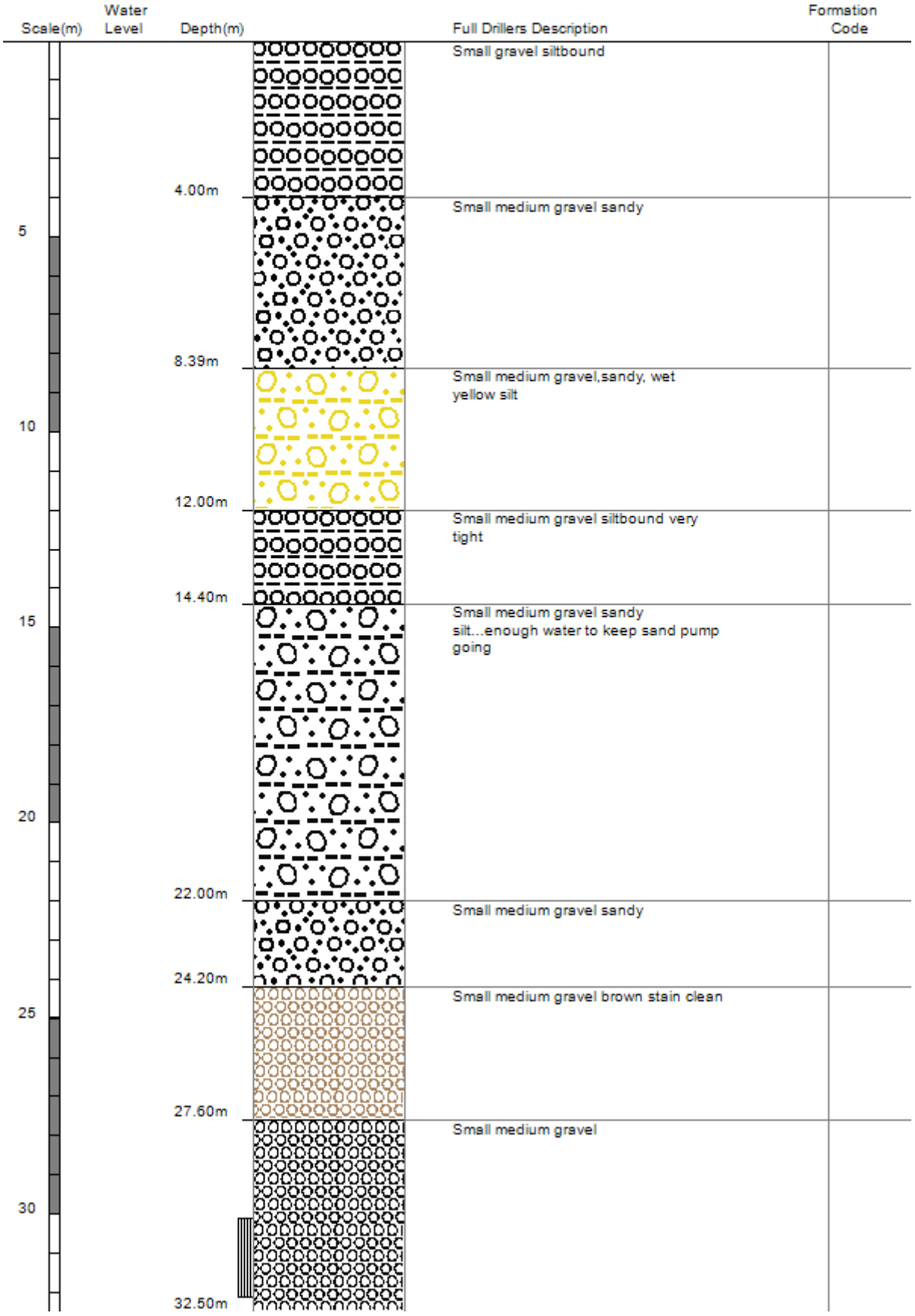


Bore or Well No	M36/5038
Well Name	DUNNS CROSSING ROAD
Owner	KAJENS TRADING DEVELOPMENT LTD

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

Well Number	M36/5038	**File Number**	CO6C/10010
Owner	KAJENS TRADING DEVELOPMENT LTD	**Well Status**	Active (exist, present)
Street/Road	DUNNS CROSSING ROAD	**NZTM Grid Reference**	BX23:49278-69840
Locality	ROLLESTON	**NZTM X and Y**	1549278 - 5169840
Location Description		**Location Accuracy**	50 - 300m
CWMS Zone	Selwyn - Waihora	**Use**	Domestic Supply,
Groundwater Allocation Zone	Selwyn-Waimakariri	**Water Level Monitoring**	--
Depth	32.10m	**Water Level Count**	0
Diameter	150mm	**Initial Water Level**	6.30m below MP
Measuring Point Description		**Highest Water Level**	
Measuring Point Elevation	40.38m above MSL (Lyttelton 1937)	**Lowest Water Level**	
Elevation Accuracy	< 2.5 m	**First reading**	
Ground Level	0.00m above MP	**Last reading**	
Strata Layers	7	**Calc Min 80%**	9.58m below MP (Estimated)
Aquifer Name		**Aquifer Tests**	0
Aquifer Type	Unknown	**Yield Drawdown Tests**	1
Drill Date	01 Nov 1996	**Max Tested Yield**	24 l/s
Driller	Dynes Road Drilling	**Drawdown at Max Tested Yield**	9 m
Drilling Method	Cable Tool	**Specific Capacity**	2.84 l/s/m
Casing Material	STEEL	**Last Updated**	08 Nov 2013
Pump Type	Unknown	**Last Field Check**	
Water Use Data	No		

Screens

Screen No.	Screen Type	Top (m)	Bottom (m)	Slot Size (mm)	Slot Length (mm)	Diameter (mm)	Leader Length (mm)
1	Stainless steel	30.1	32.1				

Step Tests

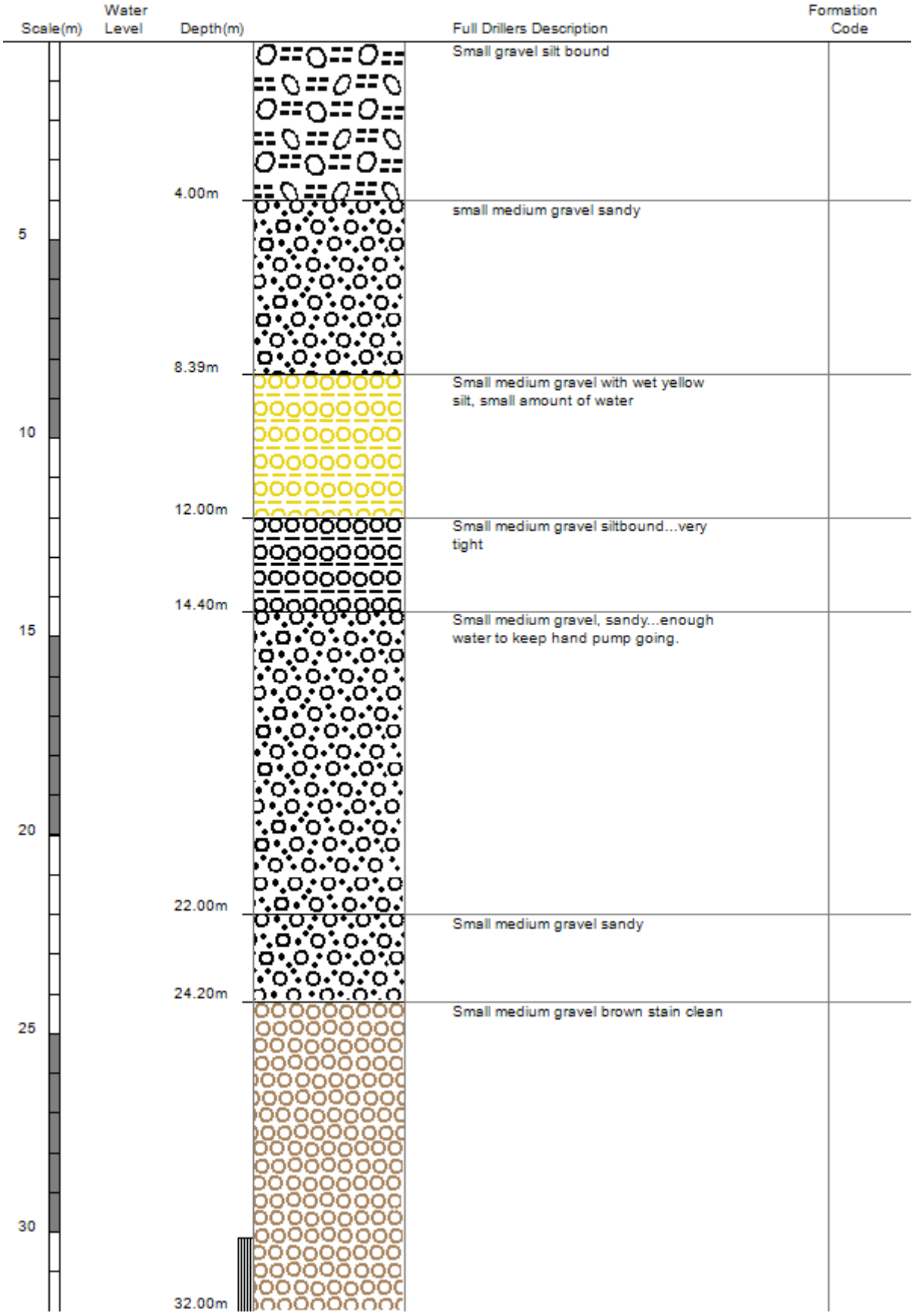
Step Test Date	Step	Yield	Yield GPM	DrawDown	Step Duration
01 Nov 1996	1	24.1	318.076233	8.5	2

No comments for this well

Borelog for well M36/5038

Grid Reference (NZTM): 1549278 mE, 5169841 mN
Location Accuracy: 50 - 300m
Ground Level Altitude: 40.4 m +MSD Accuracy: < 2.5 m
Driller: Dynes Road Drilling
Drill Method: Cable Tool
Borelog Depth: 32.0 m Drill Date: 01-Nov-1996

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha



ENGEO

Expect Excellence

Geotechnical Investigation

108 Dunns Crossing Road

Rolleston

Christchurch

Submitted to:

Hughes Developments Ltd

Christchurch

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ENGEO Document Control:

Report Title	Geotechnical Investigation - 108 Dunns Crossing Road, Rolleston			
Project No.	12903.000.000	Doc ID	70	
Client	Hughes Developments Ltd	Client Contact	Kelvin Black	
Distribution (PDF)	Kelvin Black			
Date	Revision Details/Status	WP	Author	Reviewer
08/11/2019	Issued to Client	JB	KF	GM

1 Introduction

ENGEO Ltd was requested by Hughes Developments Ltd to undertake a geotechnical investigation of the property at 108 Dunns Crossing Road, Rolleston, Christchurch, as outlined in our variation proposal (ref: P2019.002.259_01).

The purpose of this assessment was to conceptualise a geological model of the site, assess the likely future land performance, comment on the suitability of the site for residential subdivision, address the requirements of Section 106 of the Resource Management Act (RMA) and provide recommendations for subdivision works and foundations for typical timber framed residential dwellings.

Our scope of works included the following:

- Complete a desktop study of relevant available geotechnical and geological publications, including the NZ Geotechnical and Environment Canterbury Databases;
- Undertake a geotechnical site walkover;
- Undertake sixteen hand auger boreholes with associated Scala penetrometer tests to assess the near surface material types and strength characteristics;
- Organise and technically supervise the excavation of fourteen test pits, including geotechnical logging of the exposed soils; and
- Preparation of this report outlining our findings on the ground conditions and the suitability of the site for residential subdivision, including geotechnical advice on the likely foundation Technical Category, conceptual foundation recommendations for typical timber framed residential dwellings, and address likely geohazards as required by Section 106 of the RMA.

2 Site Description

The site covers a total area of 10.1 ha and has the following legal description (Canterbury Maps):

- 108 Dunns Crossing Road - Lot 2 DP 61278.

It is located approximately 3 km southwest of Rolleston town centre. The site is bound to the southwest by Dunns Crossing Road, and all other sides by rural properties (Figure 1).

Figure 1: Site Location Plan

Images sourced from Canterbury Maps and "© OpenStreetMap contributors". Not to scale.

3 Geological Model

3.1 Regional Geology

The site has been regionally mapped by GNS (Forsyth et al., 2008) as being underlain by brownish grey river alluvium (Q2a).

3.2 Geomorphology

The site comprises relatively flat ground, with gentle undulations and depressions in some areas. As evident on aerial imagery (Canterbury Maps, 2019) and observed during our site walkover conducted on 4 November 2019, undulating and depressed ground can be attributed to paleo-channels, which traverse the site in a general northwest to southeast trend (Figure 2). Based on observations, silty sand deposits with variable thickness (up to 0.8 m) are expected to have in-filled the paleo-channels where they have not remained as channel features. Inferred paleo-channels have been mapped to give an indication of areas with potential channel in-fill (Appendix 1).

Figure 2: Historical Aerial Imagery – 1990 to 1994

Image sourced from Canterbury Maps. Not to scale.

3.3 Geohazards

3.3.1 Seismicity

There are no known or mapped faults in the immediate area of the site, however the site may be at risk of ground shaking induced by movement of proximal or distal faults.

The site is located between two recently discovered fault systems, the Greendale Fault and the Port Hills Fault, the ruptures of which initiated the ongoing Canterbury Earthquake Sequence (CES). The Greendale Fault has been mapped approximately 5.6 km north / northwest of the site and trends roughly east-west with a surface rupture length of approximately 28 km (GNS, 2015), while the Port Hills Fault remains unmapped as the fault did not rupture at the surface. Movement on the Port Hills Fault is believed to have extended to within 1 km to 2 km below ground surface.

Large regional areas of faulting (GNS, 2015) namely the Ashley Fault, Porters Pass - Amberley Fault Zone, and the Hope and Alpine Faults, are further afield but present a high seismic hazard to the Christchurch area due to the anticipated size of earthquakes generated. The largest of these faults is the Alpine Fault, which has a return period of 250 - 300 years and is expected to produce a M8 earthquake. The last rupture on the Alpine Fault is believed to have occurred in 1717 (Pettinga et al., 2001).

3.3.2 Liquefaction and Lateral Spreading

The site is located in an area mapped where “damaging liquefaction is unlikely” (NZGD Map CGD5140, 2012), and a “zone of very low liquefaction potential” (GNS, 2006).

3.4 Site Investigation

Site investigations to assess the shallow subsurface material types and strength characteristics were undertaken by ENGEO on 4 November 2019. The investigations comprised sixteen hand auger boreholes and fourteen test pit investigations with associated Scala penetrometer tests.

The investigations revealed subsurface conditions across the site are consistent with the published geological mapping, as summarised in Table 1. Hand auger and test pit logs are included in Appendix 2 of this report.

Table 1: Summary of Subsurface Conditions

Soil Type	Depth to Top of Layer (m)	General Layer Thickness (m)	Density / Consistency	Additional Comments
TOPSOIL	0.0	0.1 – 0.3	Soft to Firm	-
Silty SAND	0.2	0.7 – 0.8	Loose to Dense	Present in TP09 and TP11
Sandy Gravel	0.1 – 1.0	Unknown	Medium Dense to Very Dense	Consistent across the site

3.5 ECan Boreholes

A review of four deep ECan borehole logs was conducted. The first (M36/4450), is located on-site, and appears to be a water well servicing the properties irrigation. The other boreholes are located to the north (M36/5038), north east (M36/5041) and south (M36/4449) of the site. A borehole is located west of Dunns Crossing Road (M36/8130) but has no borehole data for the first 54 m of the soil profile on Canterbury Maps (Figure 3)

Well logs from the four holes of interest are presented in Appendix 3 and summarised in Table 2.

Table 2: Generalised Summary of ECan Boreholes

ECan Borehole	Total Depth (m)	Water level (m)	Generalised borelog as logged by driller
M36/4449	24	7.7	Gravel to 24 m with a layer of clay from 12 to 14 m and sandy gravel from 14 to 18 m.
M36/4450	26	8.1	Gravel to 26 m with a layer of clay from 12 to 18 m, 22 to 24 m and 26 o 26.5 m.
M36/5038	32	8.5	Silt bound gravel to 4 m and gravel to 32 m with a layer of silty gravel 12 to 14.4 m.
M36/5041	34	8.6	Gravel to 34 m with layers of silt bound gravel from 2 to 5.4 m and 8.2 to 12.8 m.

Figure 3: Nearby ECan Borehole Locations

Aerial photograph sourced from Canterbury Maps. Not to scale.

3.6 Groundwater

Groundwater is recorded in the surrounding boreholes between approximately 7.7 m and 8.6 m depth.

3.7 Site Seismic Class

In accordance with NZS 1170.5:2004, Class D applies to this particular site, defining it as a 'deep soft soil site'.

4 Liquefaction Assessment

Owing to the nature of the subsurface materials and depth to groundwater at the site, we consider the potential for liquefaction and lateral spreading on the site to be very low.

We therefore consider future land performance to be in line with Technical Category 1 (TC1), whereby future land damage from liquefaction is unlikely, and ground settlements are expected to be within normally accepted tolerances.

5 RMA Section 106 Requirements and Suitability to Subdivide

Section 106 of the Resource Management Act 1991 states a consent authority may refuse to grant a subdivision consent, or may grant a consent subject to specific consent conditions if it considers that:

- There is a significant risk from natural hazards; or
- Sufficient provision has not been made for legal or physical access to each allotment to be created by the subdivision.

An assessment of the risk from natural hazards as required by the RMA includes the following:

- The likelihood of natural hazards occurring (whether individually or in combination);
- The material damage to land in respect of which the consent is sought, other land, or structures that would result from natural hazards; and
- Any likely subsequent use of the land in respect of which the consent is sought that would accelerate, worsen, or result in material damage of the kind referred to in paragraph (b).

We have assessed the risk of natural hazards at the site in accordance with Section 106 of the Resource Management Act (RMA) and considered the risk to the site from rockfall, inundation (debris), slope stability, subsidence, flooding and tsunami. Based on our observations and the nature of the site, its performance during the CES, and the site's distance from the nearest significant watercourse, we consider it is unlikely for the site to be subject to natural hazards such as rockfall, inundation (debris), slope stability, subsidence, flooding and tsunami. As such, the site is considered suitable for subdivision from a geotechnical perspective.

6 Geotechnical Recommendations

6.1 Earthworks

Earthworks carried out for the subdivision shall be in accordance with NZS 4404:2010, Land Development and Subdivision Infrastructure and NZS 4431:1989, Code of Practice for Earth filling for Residential Development. In particular, any areas to receive fill should be stripped of all vegetation, topsoil, non-engineered fill, soft or organic soils prior to fill placement.

Fill may comprise clean natural sandy gravel or silty soils, or clean imported soils and / or granular fill, compacted to achieve no less than 95% of maximum dry density. Fill faces steeper than 2V:1H and higher than 600 mm should be retained and referred back to ENGEO. Although unlikely, where any springs or groundwater seeps are encountered, they should be intercepted with suitable drainage and discharged to a Council approved outlet.

All unretained batters of pond and stormwater drains constructed with the native sandy gravel material should be at an inclination no steeper than 1V:3H, with protection schemes in place to control erosion of the formed batters within the waterways.

A comprehensive earthworks specification should be provided to the earthworks contractor prior to starting excavations and an inspection / testing regime agreed, along with a robust erosion and sediment control plan.

6.2 Subdivision Roading

Vegetation, any organic or deleterious material, topsoil and non-engineered fill should be removed from the site under pavement areas prior to aggregate placement. Based on our observations during testing, we consider the natural ground below the topsoil at the site should provide an adequate subgrade for the proposed pavement areas.

6.3 Stormwater Control

Concentrated stormwater flows from all impermeable areas must be collected and carried in sealed pipes to the Council system or an alternative disposal point subject to approval from Council. Uncontrolled stormwater must not be allowed to saturate the ground as this will potentially affect future foundation performance both statically and during future seismic activity.

6.4 Foundations

Foundations for future proposed residential dwellings within the subdivision may comprise shallow pad, strip, or slab foundations designed in accordance with the provisions of NZS 3604 Timber Framed Buildings.

Site specific testing will be required for Building Consent, to confirm the bearing materials and capacity. For preliminary design, we anticipate that a geotechnical Ultimate Bearing Capacity of 300 kPa may be assumed for foundations bearing on sandy gravel or engineered fill, below any topsoil. We anticipate this to be typically below 0.3 m depth based on our subsurface investigations.

7 References

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Standards Association of New Zealand (2010). NZS 3604:2010. Timber Framed Buildings.

Standards Association of New Zealand (2010). NZS 4404:2010. Land Development and Subdivision Infrastructure.

The Ministry of Business, Innovation, and Employment (2016). New Zealand Geotechnical Database. Retrieved November 2019, from https://www.nzgd.org.nz.

8 Limitations

i. We have prepared this report in accordance with the brief as provided. This report has been prepared for the use of our client, Hughes Developments Ltd, their professional advisers and the relevant Territorial Authorities in relation to the specified project brief described in this report. No liability is accepted for the use of any part of the report for any other purpose or by any other person or entity.

ii. The recommendations in this report are based on the ground conditions indicated from published sources, site assessments and subsurface investigations described in this report based on accepted normal methods of site investigations. Only a limited amount of information has been collected to meet the specific financial and technical requirements of the client's brief and this report does not purport to completely describe all the site characteristics and properties. The nature and continuity of the ground between test locations has been inferred using experience and judgement and it should be appreciated that actual conditions could vary from the assumed model.

iii. Subsurface conditions relevant to construction works should be assessed by contractors who can make their own interpretation of the factual data provided. They should perform any additional tests as necessary for their own purposes.

iv. This Limitation should be read in conjunction with the Engineering NZ/ACENZ Standard Terms of Engagement.

v. This report is not to be reproduced either wholly or in part without our prior written permission.

We trust that this information meets your current requirements. Please do not hesitate to contact the undersigned on (03) 328 9012 if you require any further information.

Report prepared by

Kristian Fairley

Engineering Geologist

Jed Watts

Engineering Geologist

Report reviewed by

Greg Martin, CMEngNZ (PEngGeol)

Principal Engineering Geologist

APPENDIX 1:

Site Plan and Inferred Paleo Channels

DATE PLOTTED: 07 November 2019 8:54:59 am BY: NFlatman

Legend

- Hand auger locations
- Test pit locations
- Flow Path
- Site boundary

Aerial: LINZ and Eagle Technology, CC-BY-3.0-NZ.
Map image: LINZ NZTopo Series, CC-BY-3.0-NZ.

PROJECTION: NZGD 2000 New Zealand Transverse Mercator

Christchurch Office
124 Montreal Street, Sydenham, Christchurch 8023
Tel: 03 328 9012, www.engeo.co.nz

Title: Site Location Plan

Client: Hughes Developments Ltd		Figure No: 1
Project: 108 Dunns Crossing Road Rolleston	Designed: NF Drawn: NF Checked: XX Date: Nov 19	Size: A3
Proj No: 12903.001.000	Scale: 1:2,000	Revision: A

ORIGINAL FIGURE PRINTED IN COLOUR

PATH: Z:\Projects\12901 to 13000\12903 - Farrington South Subdivision\052_108 Dunns Crossing Road - Enviro\05_CAD-GIS & Figures\Fig_01 landscape.mxd

APPENDIX 2:

ENGEO Hand Auger and Test Pit Logs

LOG OF AUGER HA01

Geotechnical Investigation
108 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 6.11.2019
Hole Depth : 0.2 m
Hole Diameter : 50 mm

Shear Vane No : 1379
Logged By : KF
Reviewed By : JRW
Latitude : -43.624284
Longitude : 172.375188

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TOPSOIL	ML	SILT with some sand, trace gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				D	F-St	
			End of Hole Depth: 0.2 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

0.5

1.0

1.5

Hand auger met practical refusal at 0.2 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered.

LOG OF AUGER HA02

Geotechnical Investigation
108 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 6.11.2019
Hole Depth : 0.3 m
Hole Diameter : 50 mm

Shear Vane No : 1379
Logged By : KF
Reviewed By : JRW
Latitude : -43.623539
Longitude : 172.375633

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0	TOPSOIL	ML	SILT with some sand and trace rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				D	St	98/15
			Trace gravel from 0.2 m depth.						
			End of Hole Depth: 0.3 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

0.5

1.0

1.5

Hand auger met practical refusal at 0.3 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered.

LOG OF AUGER HA03

Geotechnical Investigation
108 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 6.11.2019
Hole Depth : 0.3 m
Hole Diameter : 50 mm

Shear Vane No : 1379
Logged By : KF
Reviewed By : JRW
Latitude : -43.624218
Longitude : 172.374109

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0	TOPSOIL	ML	SILT with some sand, trace gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				D	F-St	
			Gravel becomes minor from 0.2 m depth. Gravel, fine, subangular to subrounded.						
			End of Hole Depth: 0.3 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

0.5

1.0

1.5

Hand auger met practical refusal at 0.3 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.4 m depth.
Standing groundwater was not encountered.

LOG OF AUGER HA04

Geotechnical Investigation
108 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 6.11.2019
Hole Depth : 0.2 m
Hole Diameter : 50 mm

Shear Vane No : 1379
Logged By : KF
Reviewed By : JRW
Latitude : -43.624599
Longitude : 172.373074

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0.0	TOPSOIL	ML	SILT with some sand, trace gravel, wood and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				D	F-St	
			End of Hole Depth: 0.2 m Termination Condition: Practical refusal						
0.5									
1.0									
1.5									

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.2 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered.

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LOG OF AUGER HA05

Geotechnical Investigation
108 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 6.11.2019
Hole Depth : 0.2 m
Hole Diameter : 50 mm

Shear Vane No : 1379
Logged By : KF
Reviewed By : JRW
Latitude : -43.625011
Longitude : 172.373546

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0.0	TOPSOIL	ML	SILT with some sand, trace gravel, wood and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				M	F-St	
			End of Hole Depth: 0.2 m Termination Condition: Practical refusal						
0.5									
1.0									
1.5									

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.2 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.5 m depth.
Standing groundwater was not encountered.

GEOTECH HAND AUGER 2019.11.07 - HAND AUGER LOGS.GPJ NZ DATA TEMPLATE 2.GDT 7/11/19

LOG OF AUGER HA06

Geotechnical Investigation
108 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 6.11.2019
Hole Depth : 0.4 m
Hole Diameter : 50 mm

Shear Vane No : 1379
Logged By : KF
Reviewed By : JRW
Latitude : -43.62482
Longitude : 172.372715

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TOPSOIL	ML	SILT with some sand and trace rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				D	F-St	
	A	ML	Sandy SILT with trace gravel; greyish brown. Poorly graded. Sand, fine.				M	St-VSt	
			End of Hole Depth: 0.4 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

0.5

1.0

1.5

Hand auger met practical refusal at 0.4 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.8 m depth.
Standing groundwater was not encountered.
A = ALLUVIUM

LOG OF AUGER HA07

Geotechnical Investigation
108 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 6.11.2019
Hole Depth : 0.3 m
Hole Diameter : 50 mm

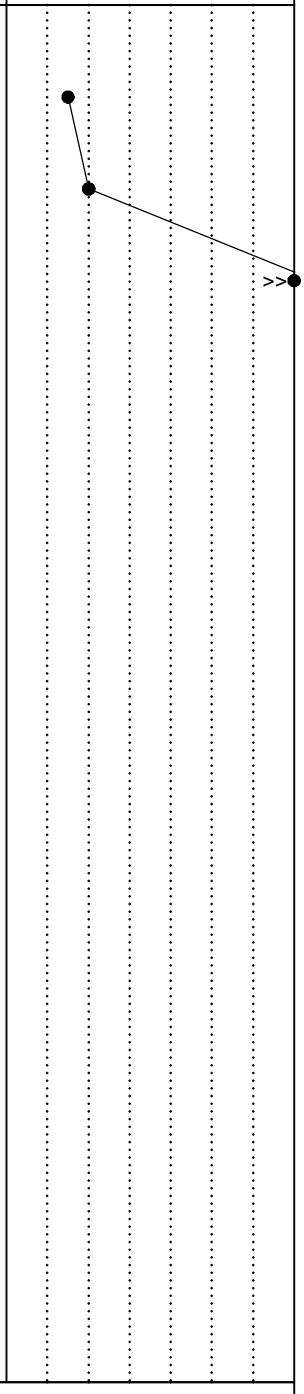
Shear Vane No : 1379
Logged By : KF
Reviewed By : JRW
Latitude : -43.625244
Longitude : 172.372951

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0	TOPSOIL	ML	SILT with minor sand and trace rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				D	F-St	
			Trace gravel encountered from 0.2 m depth.						
			End of Hole Depth: 0.3 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12



0.5

1.0

1.5

Hand auger met practical refusal at 0.3 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered.

LOG OF AUGER HA08

Geotechnical Investigation
108 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 6.11.2019
Hole Depth : 0.4 m
Hole Diameter : 50 mm

Shear Vane No : 1379
Logged By : KF
Reviewed By : JRW
Latitude : -43.625581
Longitude : 172.37221

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TOPSOIL	ML	SILT with minor sand and trace rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				D	F-St	
			Trace gravel encountered from 0.2 m depth.						
	A	ML	Sandy SILT with trace gravel; greyish brown. Poorly graded. Sand, fine to medium.					St-VSt	
			End of Hole Depth: 0.4 m Termination Condition: Practical refusal						
0.5									
1.0									
1.5									

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.4 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.5 m depth.
Standing groundwater was not encountered.
A = ALLUVIUM

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LOG OF AUGER HA09

Geotechnical Investigation
108 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 6.11.2019
Hole Depth : 0.2 m
Hole Diameter : 50 mm

Shear Vane No : 1379
Logged By : KF
Reviewed By : JRW
Latitude : -43.625131
Longitude : 172.371905

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TOPSOIL	ML	SILT with minor sand, trace gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				D	F-St	
			End of Hole Depth: 0.2 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

0.5

1.0

1.5

Hand auger met practical refusal at 0.2 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered.

LOG OF AUGER HA10

Geotechnical Investigation
108 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 6.11.2019
Hole Depth : 0.3 m
Hole Diameter : 50 mm

Shear Vane No : 1379
Logged By : KF
Reviewed By : JRW
Latitude : -43.624514
Longitude : 172.372119

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TOPSOIL	ML	SILT with minor sand, trace gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				D	F-St	
	A	ML	Sandy SILT with trace gravel; greyish brown. Poorly graded. Sand, fine to medium.					St-VSt	
			End of Hole Depth: 0.3 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

0.5

1.0

1.5

>>

Hand auger met practical refusal at 0.3 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.5 m depth.
Standing groundwater was not encountered.
A = ALLUVIUM

GEOTECH HAND AUGER 2019.11.07 - HAND AUGER LOGS.GPJ NZ DATA TEMPLATE 2.GDT 7/11/19

LOG OF AUGER HA11

Geotechnical Investigation
108 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 6.11.2019
Hole Depth : 0.2 m
Hole Diameter : 50 mm

Shear Vane No : 1379
Logged By : KF
Reviewed By : JRW
Latitude : -43.62435
Longitude : 172.371175

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TOPSOIL	ML	SILT with minor sand, trace gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				D	F-St	
			End of Hole Depth: 0.2 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

0.5

1.0

1.5

Hand auger met practical refusal at 0.2 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.4 m depth.
Standing groundwater was not encountered.

LOG OF AUGER HA12

Geotechnical Investigation
108 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 6.11.2019
Hole Depth : 0.5 m
Hole Diameter : 50 mm

Shear Vane No : 1379
Logged By : KF
Reviewed By : JRW
Latitude : -43.623729
Longitude : 172.371551

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0	TOPSOIL	ML	SILT with minor sand, trace gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				D	F-St	
	ALLUVIUM	ML	Sandy SILT with trace gravel; greyish brown. Poorly graded. Sand, fine to medium.					St-VSt	
0.5			End of Hole Depth: 0.5 m Termination Condition: Practical refusal						
1.0									
1.5									

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.5 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.4 m depth.
Standing groundwater was not encountered.
A = ALLUVIUM

GEOTECH HAND AUGER 2019.11.07 - HAND AUGER LOGS.GPJ NZ DATA TEMPLATE 2.GDT 7/11/19

LOG OF AUGER HA13

Geotechnical Investigation
108 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 6.11.2019
Hole Depth : 0.2 m
Hole Diameter : 50 mm

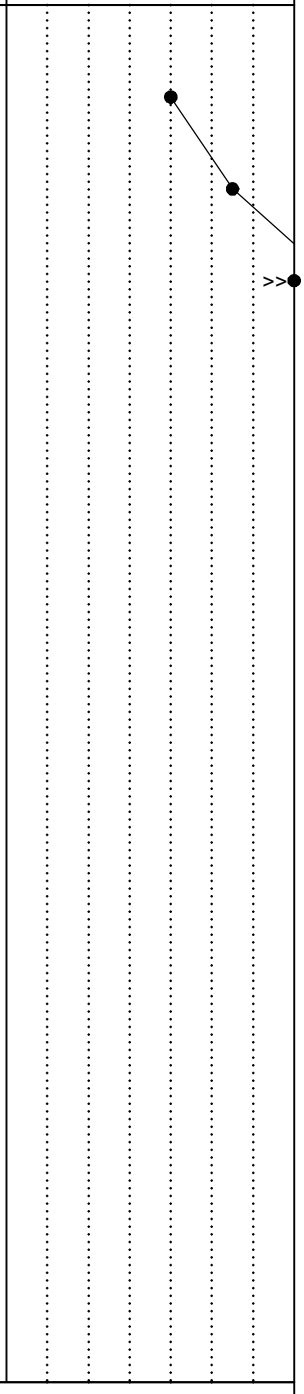
Shear Vane No : 1379
Logged By : KF
Reviewed By : JRW
Latitude : -43.622894
Longitude : 172.373074

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TOPSOIL	ML	SILT with some sand, minor gravel and trace rootlets; brown. Low plasticity. Sand, fine. Gravel, fine, subangular to subrounded [TOPSOIL].				D	F-St	
			End of Hole Depth: 0.2 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12



0.5

1.0

1.5

Hand auger met practical refusal at 0.2 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered.

GEOTECH HAND AUGER 2019.11.07 - HAND AUGER LOGS.GPJ NZ DATA TEMPLATE 2.GDT 7/11/19

LOG OF AUGER HA14

Geotechnical Investigation
108 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 6.11.2019
Hole Depth : 0.2 m
Hole Diameter : 50 mm

Shear Vane No : 1379
Logged By : KF
Reviewed By : JRW
Latitude : -43.622343
Longitude : 172.374581

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0.0	TOPSOIL	ML	SILT with some sand, minor gravel and trace rootlets; brown. Low plasticity. Sand, fine. Gravel, fine, subangular to subrounded [TOPSOIL].				D	F-St	
			End of Hole Depth: 0.2 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.2 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.6 m depth.
Standing groundwater was not encountered.

GEOTECH HAND AUGER 2019.11.07 - HAND AUGER LOGS.GPJ NZ DATA TEMPLATE 2.GDT 7/11/19

LOG OF AUGER HA15

Geotechnical Investigation
108 Dunns Crossing Road
Rolleston
12903

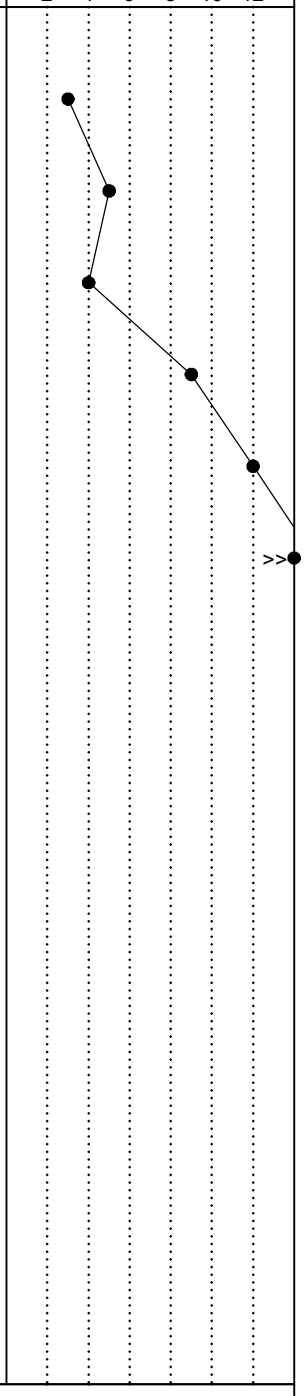
Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 6.11.2019
Hole Depth : 0.3 m
Hole Diameter : 50 mm

Shear Vane No : 1379
Logged By : KF
Reviewed By : JRW
Latitude : -43.623853
Longitude : 172.373841

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0	TOPSOIL	ML	SILT with minor sand and trace rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				M	F-St	
			End of Hole Depth: 0.3 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm



Hand auger met practical refusal at 0.3 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.6 m depth.
Standing groundwater was not encountered.

LOG OF AUGER HA16

Geotechnical Investigation
108 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 6.11.2019
Hole Depth : 0.4 m
Hole Diameter : 50 mm

Shear Vane No : 1379
Logged By : KF
Reviewed By : JRW
Latitude : -43.623384
Longitude : 172.37346

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0	TOPSOIL	ML	SILT with minor sand and trace rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				M	F-St	
	ALLUVIUM	ML	SILT with some sand and trace gravel; greyish brown. Low plasticity. Sand, fine.					St-VSt	
0.4			End of Hole Depth: 0.4 m Termination Condition: Practical refusal						
0.5									
1.0									
1.5									

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

>>

Hand auger met practical refusal at 0.4 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 1.3 m depth.
Standing groundwater was not encountered.
A = ALLUVIUM

GEOTECH HAND AUGER 2019.11.07 - HAND AUGER LOGS.GPJ NZ DATA TEMPLATE 2.GDT 7/11/19

LOG OF TEST PIT TP01

Geotechnical Investigation
108 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 4.11.2019
Max Test Pit Depth : 2 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size : 24 Tonne

Shear Vane No : N/A
Logged By : KF
Reviewed By : JRW
Latitude : -43.623566
Longitude : 172.374608

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier – Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0	TS		ML	SILT with some sand, travel gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].					S-F		
	ALLUVIUM		GW	Sandy fine to coarse GRAVEL with some silt and trace rootlets; greyish brown. Well graded, subangular to subrounded. Sand, fine to medium.				D			
0.5				Sandy fine to coarse GRAVEL; grey. Well graded, subangular to subrounded. Sand, fine to coarse.							
				Becomes moist from 0.7 m depth.							
1.0				Trace cobble from 0.9 m depth.					MD-D		
			GW					M			
1.5				Cobble becomes minor from 1.7 m depth.							
2.0				Depth of Excavation: 2 m Termination Condition: Target depth							
2.5											

Test pit met target depth.
Scala Penetrometer met practical refusal.
Standing groundwater was not encountered.

TS = TOPSOIL

LOG OF TEST PIT TP02

Geotechnical Investigation
108 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 4.11.2019
Max Test Pit Depth : 2 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size : 24 Tonne
Shear Vane No : N/A
Logged By : KF
Reviewed By : JRW
Latitude : -43.623119
Longitude : 172.374217

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0	TS		ML	SILT with some sand, travel gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				D	S-F		
0.5	ALLUVIUM		GW	Sandy fine to medium GRAVEL with trace silt and rootlets; greyish brown. Well graded, subangular to subrounded. Sand, fine to coarse.					MD-D		
1.0			SW	Gravelly fine to coarse SAND; brownish grey. Well graded. Gravel, fine to coarse, subangular to subrounded.				M	MD-D		
1.5			GW	Sandy fine to coarse GRAVEL with trace cobble; grey. Well graded, subangular to subrounded. Sand, fine to coarse. Trace rootlets encountered from 1.5 m depth.					MD-D		
2.0				Depth of Excavation: 2 m Termination Condition: Target depth							
2.5											

Scala Penetrometer: Blows per 100mm — 2 4 6 8 10 12

Test pit met target depth.
Scala Penetrometer met practical refusal.
Standing groundwater was not encountered.

TS = TOPSOIL

LOG OF TEST PIT TP03

Geotechnical Investigation
108 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 4.11.2019
Max Test Pit Depth : 2 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size : 24 Tonne

Shear Vane No : N/A
Logged By : KF
Reviewed By : JRW
Latitude : -43.624211
Longitude : 172.372983

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
0	TS		ML	SILT with some sand, travel gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].					S-F		
0.5	ALLUVIUM		GW	Sandy fine to coarse GRAVEL with trace silt and rootlets; greyish brown. Well graded, subangular to subrounded. Sand, fine to coarse.				D	MD-D		
1.0				No silt and trace cobbles encountered from 1.0 m depth.							
1.5				Becomes moist and grey from 1.2 m depth. Sand becomes some from 1.4 to 1.6 m depth.				M			
2.0				Depth of Excavation: 2 m Termination Condition: Target depth							
2.5											

Test pit met target depth.
Scala Penetrometer met practical refusal.
Standing groundwater was not encountered.

TS = TOPSOIL

LOG OF TEST PIT TP04

Geotechnical Investigation
108 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 4.11.2019
Max Test Pit Depth : 2 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size : 24 Tonne

Shear Vane No : N/A
Logged By : KF
Reviewed By : JRW
Latitude : -43.623729
Longitude : 172.372618

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier – Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0	TS		ML	SILT with some sand, travel gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].					S-F		
0.5	ALLUVIUM		GW	Sandy fine to coarse GRAVEL with some silt and trace rootlets; greyish brown. Well graded, subangular to subrounded. Sand, fine to coarse.				D	MD-D		
1.0				Trace silt and trace cobbles encountered from 1.0 m depth.							
				Becomes moist from 1.2 m depth.							
1.5								M			
				Sand becomes some from 1.7 m depth.							
2.0				Depth of Excavation: 2 m Termination Condition: Target depth							
2.5											

Scala Penetrometer: Blows per 100mm — 2 4 6 8 10 12 (>>)

Test pit met target depth.
Scala Penetrometer met practical refusal.
Standing groundwater was not encountered.

TS = TOPSOIL

LOG OF TEST PIT TP05

Geotechnical Investigation
108 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 4.11.2019
Max Test Pit Depth : 1.9 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size : 24 Tonne
Shear Vane No : N/A
Logged By : KF
Reviewed By : JRW
Latitude : -43.6239
Longitude : 172.374871

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier – Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0	TS		ML	SILT with some sand, travel gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				D	S-F		
0.5	ALLUVIUM		GW	Sandy fine to coarse GRAVEL with trace rootlets; greyish brown. Well graded, subangular to subrounded. Sand, fine to coarse.				M	MD-D		
1.0				Sand becomes trace from 0.8 to 1.0 m depth.							
1.5				Trace cobbles encountered from 1.2 m depth.							
2.0				Depth of Excavation: 1.9 m Termination Condition: Practical refusal							
2.5											

Scala Penetrometer: Blows per 100mm — 2 4 6 8 10 12 (>>)

Test pit met practical refusal
Scala Penetrometer met practical refusal.
Standing groundwater was not encountered.

Loosely packed gravel and pit collapse from 0.5 to 1.9 m depth.
TS = TOPSOIL

LOG OF TEST PIT TP06

Geotechnical Investigation
108 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 4.11.2019
Max Test Pit Depth : 2 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size : 24 Tonne

Shear Vane No : N/A
Logged By : KF
Reviewed By : JRW
Latitude : -43.623947
Longitude : 172.37603

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0.0	TS		ML	SILT with some sand, travel gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].					S-F		
0.5	ALLUVIUM		GW	Sandy fine to coarse GRAVEL with some silt and trace rootlets; greyish brown. Well graded, subangular to subrounded. Sand, fine to coarse.				D	MD-D		
1.0				Becomes moist and trace silt encountered from 0.7 m depth.				M			
1.5				No rootlets encountered from 1.4 m depth. Trace cobbles encountered from 1.5 m depth. Sand becomes some from 1.7 to 1.8 m depth.							
2.0				Depth of Excavation: 2 m Termination Condition: Target depth							
2.5											

Scala Penetrometer: Blows per 100mm — 2 4 6 8 10 12 (>>)

Test pit met target depth.
Scala Penetrometer met practical refusal.
Standing groundwater was not encountered.

TS = TOPSOIL

LOG OF TEST PIT TP07

Geotechnical Investigation
108 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 4.11.2019
Max Test Pit Depth : 2 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size : 24 Tonne

Shear Vane No : N/A
Logged By : KF
Reviewed By : JRW
Latitude : -43.623251
Longitude : 172.375413

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0	TS		ML	SILT with some sand, travel gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				D	S-F		
0.5	ALLUVIUM		GW	Sandy fine to coarse GRAVEL with trace silt, cobble and rootlets; greyish brown. Well graded, subangular to subrounded. Sand, fine to coarse.				M	MD-D		
1.0				Becomes grey from 0.8 m depth.							
1.5				Cobbles becomes minor from 1.2 m depth.							
2.0				Sand becomes some from 1.8 to 1.9 m depth.							
2.5				Depth of Excavation: 2 m Termination Condition: Target depth							

Scala Penetrometer: Blows per 100mm — 2 4 6 8 10 12 (>>)

Test pit met target depth.
Scala Penetrometer met practical refusal.
Standing groundwater was not encountered.

TS = TOPSOIL

GEOTECH TEST PIT LOG 2019.11.05 - TEST PIT LOGS.GPJ NZ MASTER DATA TEMPLATE.GDT 8/11/19

LOG OF TEST PIT TP08

Geotechnical Investigation
108 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 4.11.2019
Max Test Pit Depth : 2 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size : 24 Tonne

Shear Vane No : N/A
Logged By : KF
Reviewed By : JRW
Latitude : -43.622696
Longitude : 172.375236

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0	TS		ML	SILT with some sand, travel gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				D	S-F		
0.5	ALLUVIUM		GW	Sandy fine to coarse GRAVEL with trace silt, cobble and rootlets; greyish brown. Well graded, subangular to subrounded. Sand, fine to coarse.				M	MD-D		
				Becomes grey from 0.6 m depth.							
1.0				No rootlets encountered from 0.8 to 1.2 m depth.							
1.5											
2.0				Depth of Excavation: 2 m Termination Condition: Target depth							
2.5											

Scala Penetrometer: Blows per 100mm — 2 4 6 8 10 12 (>>)

Test pit met target depth.
Scala Penetrometer met practical refusal.
Standing groundwater was not encountered.

TS = TOPSOIL

LOG OF TEST PIT TP09

Geotechnical Investigation
108 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 4.11.2019
Max Test Pit Depth : 2 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size : 24 Tonne

Shear Vane No : N/A
Logged By : KF
Reviewed By : JRW
Latitude : -43.622572
Longitude : 172.373809

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0	TS		ML	SILT with some sand, travel gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				D	S-F		
0.5	ALLUVIUM		SM	Silty fine to medium SAND with trace gravel; brownish grey. Poorly graded. Becomes grey with orange mottles from 0.8 m depth.					MD-D		
1.0			GW	Sandy fine to coarse GRAVEL with trace silt and rootlets; grey. Well graded, subangular to subrounded. Sand, fine to coarse. Trace cobbles encountered from 1.3 m depth. Sand becomes some from 1.7 to 1.8 m depth.				M	MD-D		
1.5											
2.0				Depth of Excavation: 2 m Termination Condition: Target depth							
2.5											

Scala Penetrometer: Blows per 100mm — 2 4 6 8 10 12 (>>)

Test pit met target depth.
Scala Penetrometer met practical refusal.
Standing groundwater was not encountered.

TS = TOPSOIL

LOG OF TEST PIT TP10

Geotechnical Investigation
108 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 4.11.2019
Max Test Pit Depth : 2 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size : 24 Tonne
Shear Vane No : N/A
Logged By : KF
Reviewed By : JRW
Latitude : -43.623232
Longitude : 172.372307

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier – Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
0	TS		ML	SILT with some sand, travel gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				D	S-F		
0.5	ALLUVIUM			Sandy fine to coarse GRAVEL with trace silt and rootlets; grey. Well graded, subangular to subrounded. Sand, fine to coarse.							
1.0			GW					M	MD-D		
1.5				No rootlets encountered from 1.6 m depth.							
2.0				Depth of Excavation: 2 m Termination Condition: Target depth							
2.5											

Test pit met target depth.
Scala Penetrometer met practical refusal.
Standing groundwater was not encountered.

TS = TOPSOIL

LOG OF TEST PIT TP11

Geotechnical Investigation
108 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 4.11.2019
Max Test Pit Depth : 2 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size : 24 Tonne

Shear Vane No : N/A
Logged By : KF
Reviewed By : JRW
Latitude : -43.623923
Longitude : 172.371942

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0	TS		ML	SILT with some sand, travel gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				D	S-F		2 4 6 8 10 12
0.5	ALLUVIUM		SM	Silty fine to medium SAND with trace gravel and rootlets; brownish grey. Poorly graded.					MD-D		>>
1.0			GW	Sandy fine to coarse GRAVEL with trace rootlets; grey. Well graded, subangular to subrounded. Sand, fine to coarse.				M	MD-D		
1.5											
2.0				Depth of Excavation: 2 m Termination Condition: Target depth							
2.5											

Test pit met target depth.
Scala Penetrometer met practical refusal.
Standing groundwater was not encountered.

TS = TOPSOIL

LOG OF TEST PIT TP12

Geotechnical Investigation
108 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 4.11.2019
Max Test Pit Depth : 2 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size : 24 Tonne

Shear Vane No : N/A
Logged By : KF
Reviewed By : JRW
Latitude : -43.624622
Longitude : 172.374447

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier – Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0.0	TS		ML	SILT with some sand, travel gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].					S-F		
	ALLUVIUM		GW	Sandy fine to coarse GRAVEL with some silt and trace rootlets; greyish brown. Well graded, subangular to subrounded. Sand, fine to coarse.					MD-D		
0.5				Sandy fine to coarse GRAVEL with trace silt, cobble and rootlets; grey. Well graded, subangular to subrounded. Sand, fine to coarse.							
1.0								M			
			GW						MD-D		
1.5				Cobbles becomes minor from 1.4 m depth.							
				No rootlets encountered from 1.6 m depth.							
2.0				Depth of Excavation: 2 m Termination Condition: Target depth							
2.5											

Scala Penetrometer: Blows per 100mm — 2 4 6 8 10 12 (>>)

Test pit met target depth.
Scala Penetrometer met practical refusal.
Standing groundwater was not encountered.

TS = TOPSOIL

LOG OF TEST PIT TP13

Geotechnical Investigation
108 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 4.11.2019
Max Test Pit Depth : 2 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size : 24 Tonne
Shear Vane No : N/A
Logged By : KF
Reviewed By : JRW
Latitude : -43.62475
Longitude : 172.371561

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier – Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
0	TS		ML	SILT with some sand, travel gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				D	S-F		>>
0.5	ALLUVIUM		GW	Sandy fine to coarse GRAVEL with some silt and trace rootlets; greyish brown. Well graded, subangular to subrounded. Sand, fine to coarse. Becomes moist from 0.6 m depth. Becomes grey from 0.9 m depth.				M	MD-D		
1.0											
1.5											
2.0				Depth of Excavation: 2 m Termination Condition: Target depth							
2.5											

Test pit met target depth.
Scala Penetrometer met practical refusal.
Standing groundwater was not encountered.

TS = TOPSOIL

LOG OF TEST PIT TP14

Geotechnical Investigation
108 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 4.11.2019
Max Test Pit Depth : 2 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size : 24 Tonne

Shear Vane No : N/A
Logged By : KF
Reviewed By : JRW
Latitude : -43.623982
Longitude : 172.370928

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0	TS		ML	SILT with some sand, travel gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				D	S-F		4
0.5	ALLUVIUM		GW	Sandy fine to coarse GRAVEL with some silt and trace rootlets; greyish brown. Well graded, subangular to subrounded. Sand, fine to coarse. No rootlets encountered from 0.5 m depth. Becomes grey and trace cobbles encountered from 0.7 m depth.				M	MD-D		10
1.0											
1.5				Trace rootlets encountered from 1.8 m depth.							
2.0				Depth of Excavation: 2 m Termination Condition: Target depth							
2.5											

Test pit met target depth.
Scala Penetrometer met practical refusal.
Standing groundwater was not encountered.

TS = TOPSOIL

APPENDIX 3:

ECan Boreholes

Bore or Well No	M36/4449
Well Name	DUNNS CROSSING RD
Owner	TYACK GJ & FR

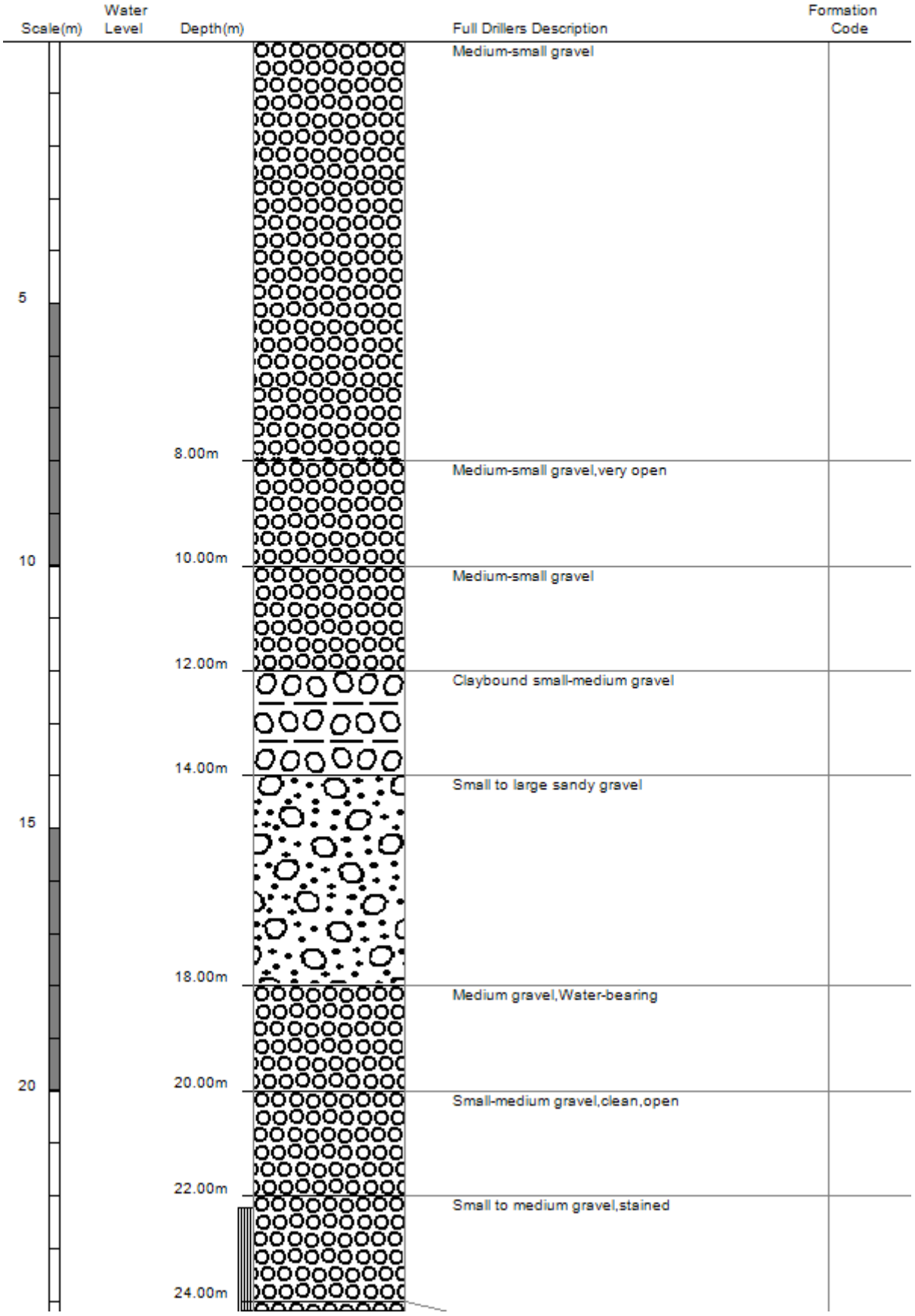
Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

Well Number	M36/4449	**File Number**	CO6C/02046
Owner	TYACK GJ & FR	**Well Status**	Not Used
Street/Road	DUNNS CROSSING RD	**NZTM Grid Reference**	BX23:49508-69470
Locality	ROLLESTON	**NZTM X and Y**	1549508 - 5169470
Location Description	LOT 1	**Location Accuracy**	50 - 300m
CWMS Zone	Selwyn - Waihora	**Use**	Irrigation,
Groundwater Allocation Zone	Selwyn-Waimakariri	**Water Level Monitoring**	--
Depth	24.20m	**Water Level Count**	0
Diameter	150mm	**Initial Water Level**	
Measuring Point Description		**Highest Water Level**	
Measuring Point Elevation	38.81m above MSL (Lyttelton 1937)	**Lowest Water Level**	
Elevation Accuracy	< 2.5 m	**First reading**	
Ground Level	0.00m above MP	**Last reading**	
Strata Layers	9	**Calc Min 95%**	7.70m below MP
Aquifer Name	Riccarton Gravel	**Aquifer Tests**	0
Aquifer Type	Unknown	**Yield Drawdown Tests**	1
Drill Date	09 Jun 1992	**Max Tested Yield**	6 l/s
Driller	Dynes Road Drilling	**Drawdown at Max Tested Yield**	5 m
Drilling Method	Cable Tool	**Specific Capacity**	1.36 l/s/m
Casing Material		**Last Updated**	08 Nov 2013
Pump Type	Unknown	**Last Field Check**	
Water Use Data	No		

Borelog for well M36/4449

Grid Reference (NZTM): 1549508 mE, 5169471 mN
Location Accuracy: 50 - 300m
Ground Level Altitude: 38.8 m +MSD Accuracy: < 2.5 m
Driller: Dynes Road Drilling
Drill Method: Cable Tool
Borelog Depth: 24.2 m Drill Date: 09-Jun-1992

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha



Bore or Well No	M36/4450
Well Name	DUNNS CROSSING RD
Owner	Mr & Mrs L K & J C Blackmore

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

Well Number	M36/4450	**File Number**	CO6C/02046
Owner	Mr & Mrs L K & J C Blackmore	**Well Status**	Active (exist, present)
Street/Road	DUNNS CROSSING RD	**NZTM Grid Reference**	BX23:49388-69660
Locality	ROLLESTON	**NZTM X and Y**	1549388 - 5169660
Location Description	DP61278 LOT 2	**Location Accuracy**	50 - 300m
CWMS Zone	Selwyn - Waihora	**Use**	Irrigation,
Groundwater Allocation Zone	Selwyn-Waimakariri	**Water Level Monitoring**	--
Depth	25.20m	**Water Level Count**	0
Diameter	150mm	**Initial Water Level**	
Measuring Point Description		**Highest Water Level**	
Measuring Point Elevation	39.62m above MSL (Lyttelton 1937)	**Lowest Water Level**	
Elevation Accuracy	< 2.5 m	**First reading**	
Ground Level	0.00m above MP	**Last reading**	
Strata Layers	8	**Calc Min 95%**	8.10m below MP
Aquifer Name	Riccarton Gravel	**Aquifer Tests**	0
Aquifer Type	Unknown	**Yield Drawdown Tests**	1
Drill Date	09 Apr 1992	**Max Tested Yield**	6 l/s
Driller	Dynes Road Drilling	**Drawdown at Max Tested Yield**	6 m
Drilling Method	Cable Tool	**Specific Capacity**	1.00 l/s/m
Casing Material		**Last Updated**	08 Nov 2013
Pump Type	Unknown	**Last Field Check**	
Water Use Data	No		

Screens

Screen No.	Screen Type	Top (m)	Bottom (m)	Slot Size (mm)	Slot Length (mm)	Diameter (mm)	Leader Length (mm)
1	Stainless steel	23.2	25.2				

Step Tests

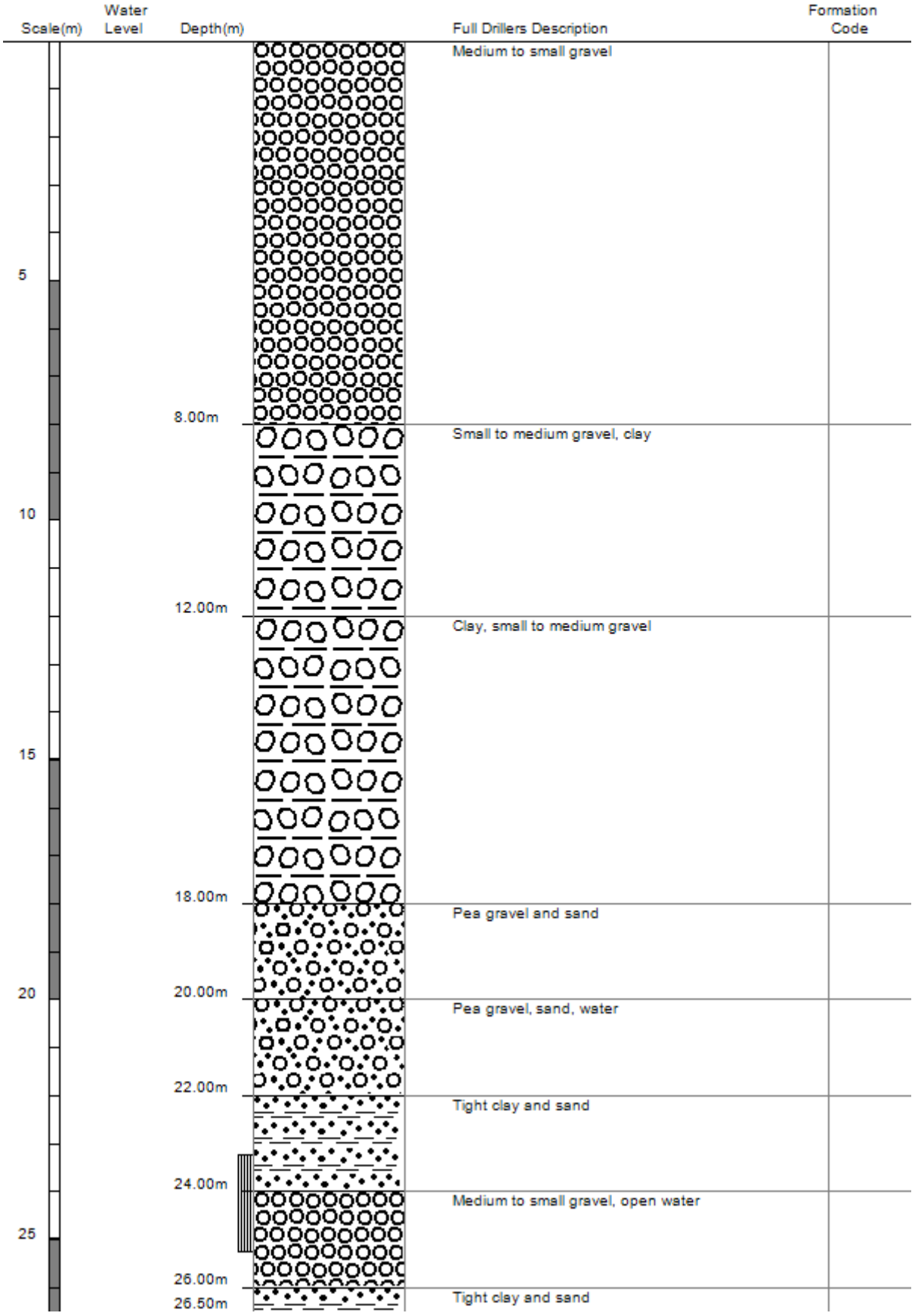
Step Test Date	Step	Yield	Yield GPM	DrawDown	Step Duration
09 Apr 1992	1	6.1	80.50892	6.1	0

No comments for this well

Borelog for well M36/4450

Grid Reference (NZTM): 1549388 mE, 5169661 mN
Location Accuracy: 50 - 300m
Ground Level Altitude: 39.6 m +MSD Accuracy: < 2.5 m
Driller: Dynes Road Drilling
Drill Method: Cable Tool
Borelog Depth: 26.5 m Drill Date: 09-Apr-1992

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha



Bore or Well No	M36/5038
Well Name	DUNNS CROSSING ROAD
Owner	KAJENS TRADING DEVELOPMENT LTD

Well Number	M36/5038	**File Number**	CO6C/10010
Owner	KAJENS TRADING DEVELOPMENT LTD	**Well Status**	Active (exist, present)
Street/Road	DUNNS CROSSING ROAD	**NZTM Grid Reference**	BX23:49278-69840
Locality	ROLLESTON	**NZTM X and Y**	1549278 - 5169840
Location Description		**Location Accuracy**	50 - 300m
CWMS Zone	Selwyn - Waihora	**Use**	Domestic Supply,
Groundwater Allocation Zone	Selwyn-Waimakariri	**Water Level Monitoring**	--
Depth	32.10m	**Water Level Count**	0
Diameter	150mm	**Initial Water Level**	6.30m below MP
Measuring Point Description		**Highest Water Level**	
Measuring Point Elevation	40.38m above MSL (Lyttelton 1937)	**Lowest Water Level**	
Elevation Accuracy	< 2.5 m	**First reading**	
Ground Level	0.00m above MP	**Last reading**	
Strata Layers	7	**Calc Min 95%**	8.50m below MP
Aquifer Name		**Aquifer Tests**	0
Aquifer Type	Unknown	**Yield Drawdown Tests**	1
Drill Date	01 Nov 1996	**Max Tested Yield**	24 l/s
Driller	Dynes Road Drilling	**Drawdown at Max Tested Yield**	9 m
Drilling Method	Cable Tool	**Specific Capacity**	2.84 l/s/m
Casing Material	STEEL	**Last Updated**	08 Nov 2013
Pump Type	Unknown	**Last Field Check**	
Water Use Data	No		

Screens

Screen No.	Screen Type	Top (m)	Bottom (m)	Slot Size (mm)	Slot Length (mm)	Diameter (mm)	Leader Length (mm)
1	Stainless steel	30.1	32.1				

Step Tests

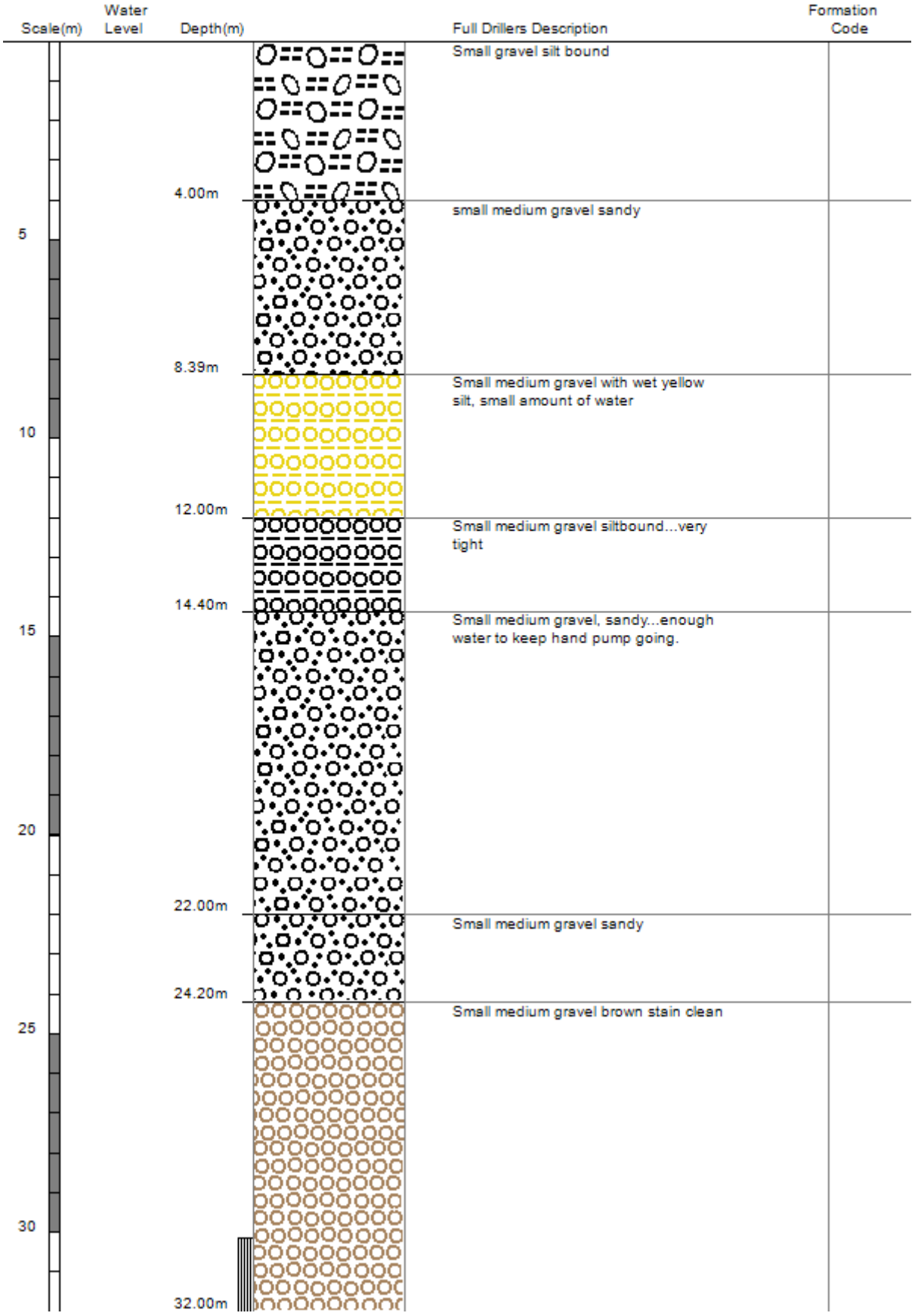
Step Test Date	Step	Yield	Yield GPM	DrawDown	Step Duration
01 Nov 1996	1	24.1	318.076233	8.5	2

No comments for this well

Borelog for well M36/5038

Grid Reference (NZTM): 1549278 mE, 5169841 mN
Location Accuracy: 50 - 300m
Ground Level Altitude: 40.4 m +MSD Accuracy: < 2.5 m
Driller: Dynes Road Drilling
Drill Method: Cable Tool
Borelog Depth: 32.0 m Drill Date: 01-Nov-1996

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha



Bore or Well No	M36/5041
Well Name	DUNNS CROSSING ROAD
Owner	KAJENS TRADING DEVELOPMENT LTD

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

Well Number	M36/5041	**File Number**	CO6C/10302
Owner	KAJENS TRADING DEVELOPMENT LTD	**Well Status**	Active (exist, present)
Street/Road	DUNNS CROSSING ROAD	**NZTM Grid Reference**	BX23:49507-69990
Locality	ROLLESTON	**NZTM X and Y**	1549507 - 5169990
Location Description		**Location Accuracy**	50 - 300m
CWMS Zone	Selwyn - Waihora	**Use**	Domestic Supply,
Groundwater Allocation Zone	Selwyn-Waimakariri	**Water Level Monitoring**	--
Depth	32.00m	**Water Level Count**	0
Diameter	150mm	**Initial Water Level**	6.80m below MP
Measuring Point Description		**Highest Water Level**	
Measuring Point Elevation	40.47m above MSL (Lyttelton 1937)	**Lowest Water Level**	
Elevation Accuracy	< 2.5 m	**First reading**	
Ground Level	0.00m above MP	**Last reading**	
Strata Layers	10	**Calc Min 95%**	8.60m below MP
Aquifer Name		**Aquifer Tests**	0
Aquifer Type	Unknown	**Yield Drawdown Tests**	1
Drill Date	01 Feb 1997	**Max Tested Yield**	5 l/s
Driller	Dynes Road Drilling	**Drawdown at Max Tested Yield**	13 m
Drilling Method	Cable Tool	**Specific Capacity**	0.40 l/s/m
Casing Material	STEEL	**Last Updated**	08 Nov 2013
Pump Type	Unknown	**Last Field Check**	
Water Use Data	No		

Screens

Screen No.	Screen Type	Top (m)	Bottom (m)	Slot Size (mm)	Slot Length (mm)	Diameter (mm)	Leader Length (mm)
1	Stainless steel	30	32				

Step Tests

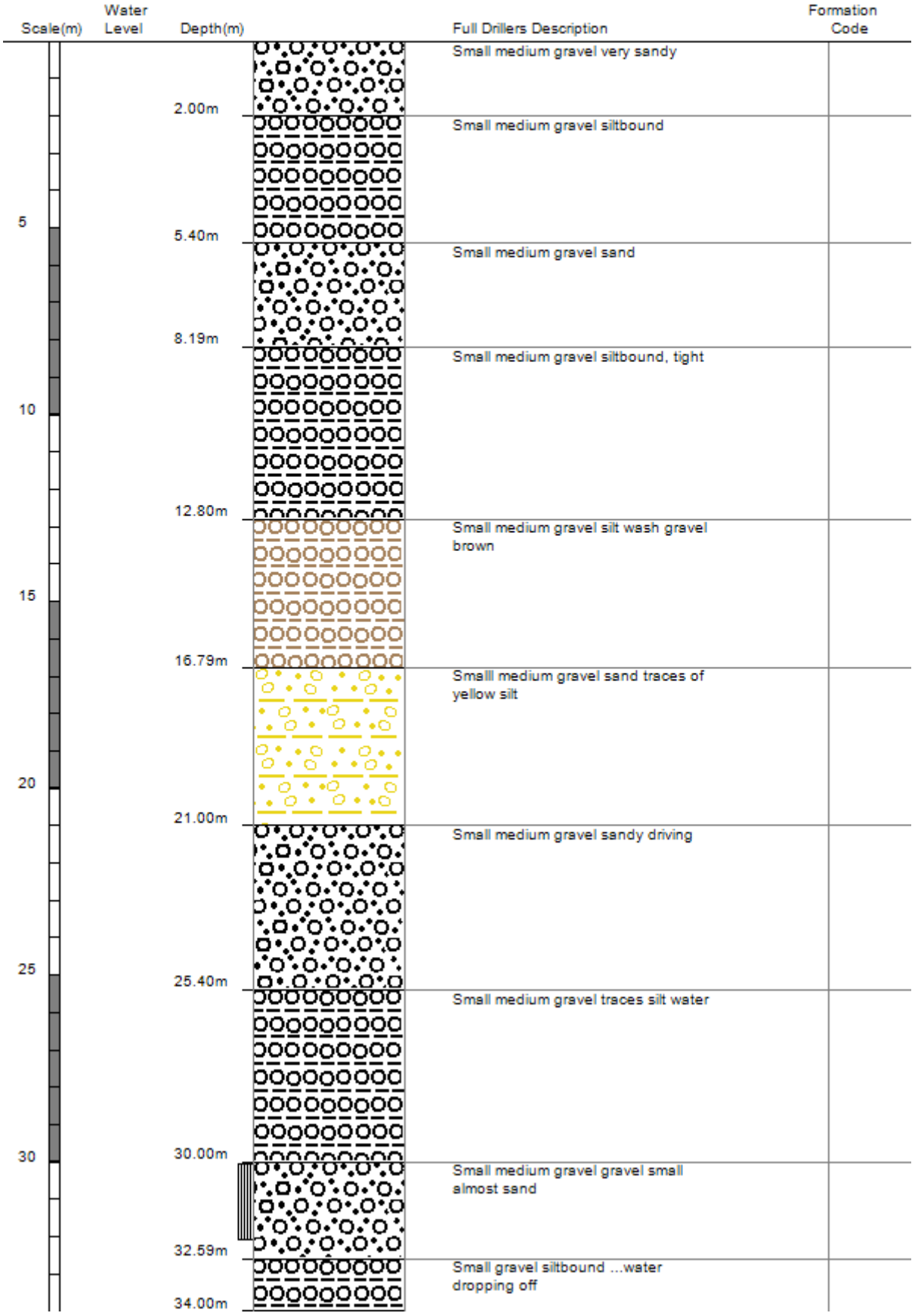
Step Test Date	Step	Yield	Yield GPM	DrawDown	Step Duration
01 Feb 1997	1	5.1	67.31074	12.8	2

No comments for this well

Borelog for well M36/5041

Grid Reference (NZTM): 1549508 mE, 5169991 mN
Location Accuracy: 50 - 300m
Ground Level Altitude: 40.5 m +MSD Accuracy: < 2.5 m
Driller: Dynes Road Drilling
Drill Method: Cable Tool
Borelog Depth: 34.0 m Drill Date: 01-Feb-1997

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha



ENGEO

Expect Excellence

Revised Geotechnical Investigation

92 Dunns Crossing Road

Rolleston

Christchurch

Submitted to:

Hughes Developments Ltd

Christchurch

ENGEO Limited
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13.12.2019
12903.001.000_02

ACENZ

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ENGEO Document Control:

Report Title	Revised Geotechnical Investigation - 92 Dunns Crossing Road, Rolleston			
Project No.	12903.001.000	Doc ID	02	
Client	Hughes Developments Ltd	Client Contact	Kelvin Back	
Distribution (PDF)	Kelvin Back			
Date	Revision Details/Status	WP	Author	Reviewer
2019/12/06	Issued to Client	JT	KF	GM
2019/12/13	Issued to Client – revised	DF	KF	GM

1 Introduction

ENGEO Ltd was requested by Hughes Developments Ltd to undertake a geotechnical investigation of the property at 92 Dunns Crossing Road, Rolleston, Christchurch, and a neighbouring section off Goulds Road, as outlined in our variation proposal (ref: P2019.002.259_01).

The purpose of this assessment was to conceptualise a geological model of the site, assess the likely future land performance, comment on the suitability of the site for residential subdivision, address the requirements of Section 106 of the Resource Management Act (RMA) and provide recommendations for subdivision works and foundations for typical timber framed residential dwellings.

Our scope of works included the following:

- Complete a desktop study of relevant available geotechnical and geological publications, including the NZ Geotechnical and Environment Canterbury Databases;
- Undertake a geotechnical site walkover;
- Undertake forty hand auger boreholes with associated Scala penetrometer tests to assess the near surface material types and strength characteristics;
- Organise and technically supervise the excavation of forty-five test pits, including geotechnical logging of the exposed soils; and
- Preparation of this report outlining our findings on the ground conditions and the suitability of the site for residential subdivision, including geotechnical advice on the likely foundation Technical Category, conceptual foundation recommendations for typical timber framed residential dwellings, and address likely geohazards as required by Section 106 of the RMA.

ENGEO previously issued a Geotechnical Investigation report dated 6 December 2019 (ref: 12903.001.000_01), which included thirty-three hand augers and thirty-two test pit investigations. Our testing scope was reduced, due to three paddocks being unavailable for testing at that time. Subsurface testing has now been completed in the three remaining paddocks, finalising the testing for this site. This version of our report supersedes our original report for the site dated 6 December 2019.

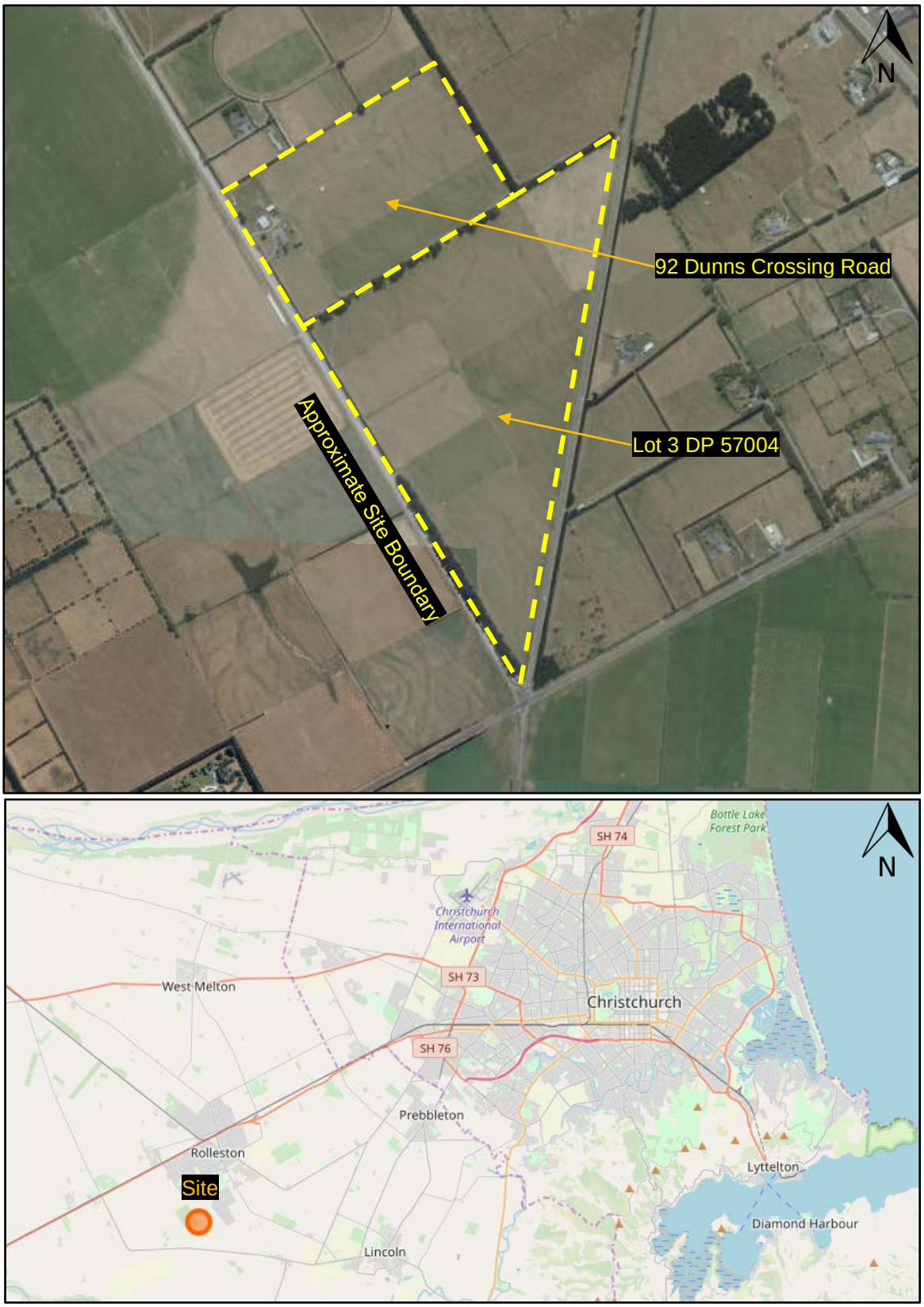
2 Site Description

The site comprises of two properties with a total area of 30.8 ha and have the following legal descriptions (Canterbury Maps):

- 92 Dunns Crossing Road - Lot 1 DP 61278 – 10.1 ha
- Lot 3 DP 57004 – 20.7 ha

They are located approximately 3 km southwest of Rolleston town centre. They are both bound to the southwest by Dunns Crossing Road. 92 Dunns Crossing Road is bound to all other sides by rural properties, whereas the neighbouring property is bound to the east by Goulds Road (Figure 1).

Figure 1: Site Location Plan



Images sourced from Canterbury Maps and "© OpenStreetMap contributors". Not to scale.

3 Geological Model

3.1 Regional Geology

The site has been regionally mapped by GNS (Forsyth et al., 2008) as being underlain by brownish grey river alluvium (Q2a).

3.2 Geomorphology

The site comprises relatively flat ground, with gentle undulations and depressions in some areas. As evident on aerial imagery (Canterbury Maps, 2019) and observed during our site walkover conducted on 21 November 2019, undulating and depressed ground can be attributed to paleo-channels, which traverse the site in a general northwest to southeast direction (Figure 2). Based on observations, sandy silt deposits with variable thickness (up to 0.6 m) are expected to have in-filled the paleo-channels where they have not remained as channel features. Inferred paleo-channels have been mapped to give an indication of areas with potential channel in-fill (Appendix 1).

Figure 2: Historical Aerial Photo – 1940 to 1944

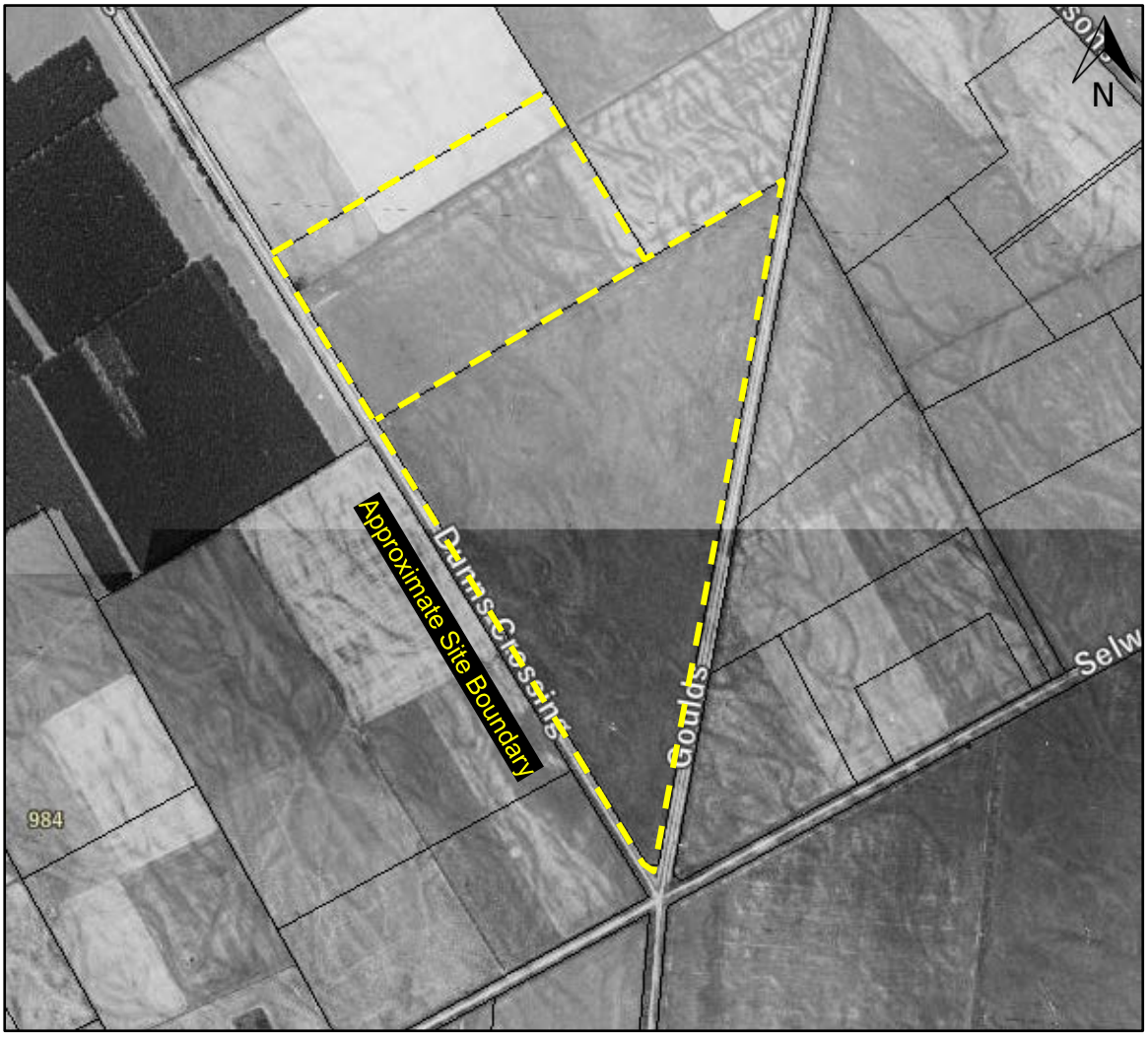


Image sourced from Canterbury Maps. Not to scale.

3.3 Geohazards

3.3.1 Seismicity

There are no known or mapped faults in the immediate area of the site, however the site may be at risk of ground shaking induced by movement of proximal or distal faults.

The site is located between two recently discovered fault systems, the Greendale Fault and the Port Hills Fault, the ruptures of which initiated the ongoing Canterbury Earthquake Sequence (CES). The Greendale Fault has been mapped approximately 6 km north / northwest of the site and trends roughly east-west with a surface rupture length of approximately 28 km (GNS, 2015), while the Port Hills Fault remains unmapped as the fault did not rupture at the surface. Movement on the Port Hills Fault is believed to have extended to within 1 km to 2 km below ground surface.

Large regional areas of faulting (GNS, 2015) namely the Ashley Fault, Porters Pass - Amberley Fault Zone, and the Hope and Alpine Faults, are further afield but present a high seismic hazard to the Christchurch area due to the anticipated size of earthquakes generated. The largest of these faults is the Alpine Fault, which has a return period of 250 - 300 years and is expected to produce a M8 earthquake. The last rupture on the Alpine Fault is believed to have occurred in 1717 (Pettinga et al., 2001).

3.3.2 Liquefaction and Lateral Spreading

The site is located in an area mapped where “damaging liquefaction is unlikely” (NZGD Map CGD5140, 2012), and a “zone of very low liquefaction potential” (GNS, 2006).

3.4 Site Investigation

Site investigations to assess the shallow subsurface material types and strength characteristics were undertaken by ENGEO from 22 November to 6 December 2019. Forty-five test pits and forty-one hand auger investigations with associated Scala Penetrometer tests were completed to a maximum depth of 2.1 m below ground level. An extra hand auger investigation was required due to the shape of the site, and the grid pattern adopted to accurately plan the testing locations.

The investigations revealed subsurface conditions across the site are consistent with the published geological mapping, as summarised in Table 2. Hand auger and test pit logs are attached as Appendix 2 of this report.

Table 1: Summary of Hand Auger Investigations

Soil Type	Depth to Top of Layer (m)	General Layer Thickness (m)	Density / Consistency	Additional Comments
TOPSOIL	0.0	0.1 – 0.2	Firm to Stiff	-
Sandy SILT	0.1 – 0.2	0.1 – 0.5	Firm to Very Stiff	Consistent across the site

Table 2: Summary of Test Pit Investigations

Soil Type	Depth to Top of Layer (m)	General Layer Thickness (m)	Density / Consistency	Additional Comments
TOPSOIL	0.0	0.1 – 0.3	Firm to Stiff	-
SILT	0.1 – 0.3	0.2 – 0.3	Stiff to Very Stiff	Present in TP11, 22, 24 and 40
Silty SAND / SAND	0.3 – 0.6	0.2 – 0.5	Medium Dense to Dense	Silty sand present in TP09, 11 and sand present in TP36
Sandy GRAVEL	0.1 – 1.0	Unknown	Medium Dense to Very Dense	Consistent across the site Noticeable sand increase in TP03, 04, and 09

3.5 ECan Boreholes

A review of six deep ECan borehole logs was conducted. The first (M36/4449 & M36/4387), are located on-site, and appear to be water wells providing the properties irrigation and domestic supply. The other boreholes are located to the north (M36/4450), east (M36/20535), south (BX23/0895) and west (M36/7416) of the site.

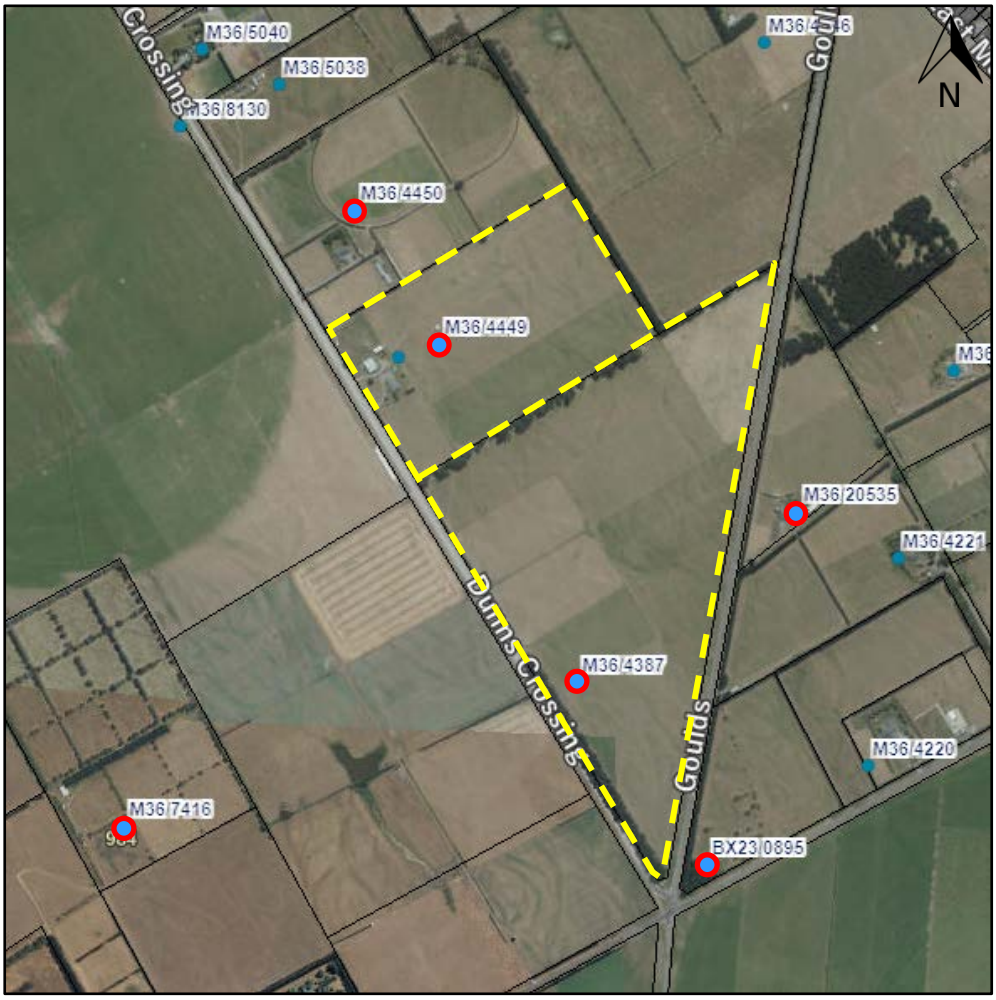
Well logs from the six holes of interest are attached to this report as Appendix 3 and summarised in Table 3.

Table 3: Generalised Summary of ECan Boreholes

ECan Borehole	Total Depth (m)	Water Level Below Ground Level (m)	Generalised Borelog as Logged by Driller
BX23/0895	53	5.35	Varying sandy and silty gravel layers to 53 m.
M36/20535	30	7.1	Topsoil to 0.3 m with gravel from 0.3 to 30 m.
M36/4387	35	6.5	Grey / sandy gravel to 35 m, with a layer of clay-bound gravel from 6.6 to 20.7 m.
M36/4449	24	7.7	Gravel to 24 m with a layer of clay from 12 to 14 m and sandy gravel from 14 to 18 m.

ECan Borehole	Total Depth (m)	Water Level Below Ground Level (m)	Generalised Borelog as Logged by Driller
M36/4450	26	8.1	Gravel to 26 m with a layer of clayey gravel from 12 to 18 m, clay and sand from 22 to 24 m and 26 to 26.5 m.
M36/7416	47	5.18	Sandy gravel to 16.8 with a layer of clay-bound sandy gravel from 5.6 to 14.7 m, and predominant gravel to 23 m. Logs not available from 23 to 47 m.

Figure 3: Nearby ECan Borehole Locations



Aerial photograph sourced from Canterbury Maps. Not to scale.

3.6 Groundwater

Groundwater is recorded in the surrounding boreholes between approximately 5.18 m and 8.1 m depth.

3.7 Site Seismic Class

In accordance with NZS 1170.5:2004, Class D applies to this particular site, defining it as a 'deep soft soil site'.

4 Liquefaction Analysis

Owing to the nature of the subsurface materials and depth to groundwater at the site, we consider the potential for liquefaction and lateral spreading on the site to be very low.

We therefore consider future land performance to be in line with Technical Category 1 (TC1), whereby future land damage from liquefaction is unlikely, and ground settlements are expected to be within normally accepted tolerances.

5 RMA Section 106 Requirements and Suitability to Subdivide

Section 106 of the Resource Management Act 1991 states a consent authority may refuse to grant a subdivision consent, or may grant a consent subject to specific consent conditions if it considers that:

- There is a significant risk from natural hazards; or
- Sufficient provision has not been made for legal or physical access to each allotment to be created by the subdivision.

An assessment of the risk from natural hazards as required by the RMA includes the following:

- The likelihood of natural hazards occurring (whether individually or in combination);
- The material damage to land in respect of which the consent is sought, other land, or structures that would result from natural hazards; and
- Any likely subsequent use of the land in respect of which the consent is sought that would accelerate, worsen, or result in material damage of the kind referred to in paragraph (b).

We have assessed the risk of natural hazards at the site in accordance with Section 106 of the Resource Management Act (RMA) and considered the risk to the site from rockfall, inundation (debris), slope stability, subsidence, flooding and tsunami. Based on our observations and the nature of the site, its performance during the CES, and the site's distance from the nearest significant watercourse, we consider it is unlikely for the site to be subject to natural hazards such as rockfall, inundation (debris), slope stability, subsidence, flooding and tsunami. As such, the site is considered suitable for subdivision from a geotechnical perspective.

6 Geotechnical Recommendations

6.1 Earthworks

Earthworks carried out for the subdivision shall be in accordance with NZS 4404:2010, Land Development and Subdivision Infrastructure and NZS 4431:1989, Code of Practice for Earth filling for Residential Development. In particular, any areas to receive fill should be stripped of all vegetation, topsoil, non-engineered fill, soft or organic soils prior to fill placement.

Fill may comprise clean natural sandy gravel or silty soils, or clean imported soils and / or granular fill, compacted to achieve no less than 95% of maximum dry density. Fill faces steeper than 2V:1H and higher than 600 mm should be retained and referred back to ENGEO. Although unlikely, where any springs or groundwater seeps are encountered, they should be intercepted with suitable drainage and discharged to a Council approved outlet.

All unretained batters of pond and stormwater drains constructed with the native sandy gravel material should be at an inclination no steeper than 1V:3H, with protection schemes in place to control erosion of the formed batters within the waterways.

A comprehensive earthworks specification should be provided to the earthworks contractor prior to starting excavations and an inspection / testing regime agreed, along with a robust erosion and sediment control plan.

6.2 Subdivision Roading

Vegetation, any organic or deleterious material, topsoil and non-engineered fill should be removed from the site under pavement areas prior to aggregate placement. Based on our observations during testing, we consider the natural ground below the topsoil at the site should provide an adequate subgrade for the proposed pavement areas.

6.3 Stormwater Control

Concentrated stormwater flows from all impermeable areas must be collected and carried in sealed pipes to the Council system or an alternative disposal point subject to approval from Council. Uncontrolled stormwater must not be allowed to saturate the ground as this will potentially affect future foundation performance both statically and during future seismic activity.

6.4 Foundations

Foundations for future proposed residential dwellings within the subdivision may comprise shallow pad, strip, or slab foundations designed in accordance with the provisions of NZS 3604 Timber Framed Buildings.

Site specific testing will be required for Building Consent, to confirm the bearing materials and capacity. For preliminary design, we anticipate that a geotechnical Ultimate Bearing Capacity of 300 kPa may be assumed for foundations bearing on sandy gravel or engineered fill, below any topsoil. All topsoil shall be stripped from within building footprints, we anticipate this to be typically below 0.1 to 0.3 m depth based on our subsurface investigations.

7 References

Canterbury Maps, Groundwater. Retrieved November 2019, from http://canterburymaps.govt.nz/Viewer.

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Forsyth, P., Barrell, D. J., & Jongens, R. (2008). Sheet 16 - Geology of the Christchurch Area 1:250,000. Lower Hutt: Institute of Geological and Nuclear Sciences.

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Standards Association of New Zealand (2010). NZS 3604:2010. Timber Framed Buildings.

Standards Association of New Zealand (2010). NZS 4404:2010. Land Development and Subdivision Infrastructure.

The Ministry of Business, Innovation, and Employment (2016). New Zealand Geotechnical Database. Retrieved November 2019, from https://www.nzgd.org.nz.

8 Limitations

i. We have prepared this report in accordance with the brief as provided. This report has been prepared for the use of our client, Hughes Developments Ltd, their professional advisers and the relevant Territorial Authorities in relation to the specified project brief described in this report. No liability is accepted for the use of any part of the report for any other purpose or by any other person or entity.

ii. The recommendations in this report are based on the ground conditions indicated from published sources, site assessments and subsurface investigations described in this report based on accepted normal methods of site investigations. Only a limited amount of information has been collected to meet the specific financial and technical requirements of the client's brief and this report does not purport to completely describe all the site characteristics and properties. The nature and continuity of the ground between test locations has been inferred using experience and judgement and it should be appreciated that actual conditions could vary from the assumed model.

iii. Subsurface conditions relevant to construction works should be assessed by contractors who can make their own interpretation of the factual data provided. They should perform any additional tests as necessary for their own purposes.

iv. This Limitation should be read in conjunction with the Engineering NZ/ACENZ Standard Terms of Engagement.

v. This report is not to be reproduced either wholly or in part without our prior written permission.

We trust that this information meets your current requirements. Please do not hesitate to contact the undersigned on (03) 328 9012 if you require any further information.

Report prepared by

Kristian Fairley

Engineering Geologist

Report reviewed by

Greg Martin, CMEngNZ (PEngGeol)

Principal Engineering Geologist

Jed Watts

Engineering Geologist

APPENDIX 1:

Site Plan and Inferred Paleo Channels

DATE PLOTTED: 10 December 2019 11:09:31 am BY: NFlatman

1550000

N

TP42 HA40 TP40 HA41 TP41 HA38 HA39 TP33 TP38 HA34 TP02 TP39 TP37 TP34 HA06 HA37 HA05 TP03 HA35 TP06 HA08 TP36 TP07 HA04 TP35 HA07 TP05 HA36 TP09 HA10 HA09 TP01 HA01 HA03 TP08 HA12 TP20 TP04 HA11 HA21 TP11 HA02 TP10 TP18 HA22 HA14 TP19 HA13 HA19 TP13 HA20 TP12 TP16 TP45 HA15 HA17 TP17 TP44 TP14 HA18 HA25 TP43 TP15 TP21 TP31 HA16 HA23 HA24 TP22 HA27 HA26 TP24 TP23 HA29 TP32 HA28 TP25 HA31 TP26 HA30 TP30 HA32 TP27 TP29 TP28 HA33

Legend

- Site boundary
- Hand auger locations
- Test pit locations
- Flow path

0 10,000 20,000 Meters

PATH: \\nzfile\nz\Projects\12901 to 13000\12903 - Farringdon South Subdivision\054_92 Dunns Crossing Road - Enviro\06_CAD-GIS & Figures\Fig01.mxd

ENGEO

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Sydenham, Christchurch 8023
Tel: 03 328 9012
www.engeo.co.nz

Title:

Site plan and inferred paleo channels

Aerial: LINZ and Eagle Technology, CC-BY-3.0-NZ.
Map image: LINZ NZTopo Series, CC-BY-3.0-NZ.

PROJECTION: NZGD 2000 New Zealand Transverse Mercator

Land Information New

Client: Hughes Developments Ltd

Project: 92 Dunns Crossing Road Rolleston Canterbury

Designed: NF
Drawn: NF
Checked: XX
Date: Dec 19

Proj No: 12903.000.000

Scale: 1:5,000

Figure No: 1

Size: A3

Revision: A

ORIGINAL FIGURE PRINTED IN COLOUR

APPENDIX 2:

ENGEO Hand Auger and Test Pit Logs

LOG OF AUGER HA01

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 22/11/2019
Hole Depth : 0.3 m
Hole Diameter : 50 mm

Shear Vane No : 1379
Logged By : KF/CR
Reviewed By : JW
Latitude : -43.626634
Longitude : 172.372952

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TS	ML	Sandy SILT with trace rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].					S-F	
	ALLUVIUM	ML	Sandy SILT with trace gravel; greyish brown. Low plasticity. Sand, fine.				D	St-H	
			End of Hole Depth: 0.3 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

0.5

1.0

1.5

Hand auger met practical refusal at 0.3 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered.
TS = TOPSOIL

GEOTECH HAND AUGER 2019.11.27 - HAND AUGER LOGS.GPJ NZ DATA TEMPLATE 2.GDT 4/12/19

LOG OF AUGER HA02

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 22/11/2019
Hole Depth : 0.3 m
Hole Diameter : 50 mm

Shear Vane No : 1379
Logged By : KF/CR
Reviewed By : JW
Latitude : -43.627341
Longitude : 172.373596

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TS	ML	Sandy SILT with trace rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].					F-St	
	ALLUVIUM	ML	Sandy SILT with minor gravel; greyish brown. Low plasticity. Sand, fine. Gravel, fine to medium, subangular to subrounded.				D	St-VSt	
			End of Hole Depth: 0.3 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

0.5

1.0

1.5

>>

Hand auger met practical refusal at 0.3 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.7 m depth.
Standing groundwater was not encountered.
TS = TOPSOIL

LOG OF AUGER HA03

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 22/11/2019
Hole Depth : 0.3 m
Hole Diameter : 50 mm

Shear Vane No : 1379
Logged By : KF/CR
Reviewed By : JW
Latitude : -43.626801
Longitude : 172.374937

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TS	ML	SILT with some sand and trace rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].					S-F	
	ALLUVIUM	ML	Sandy SILT with minor gravel; greyish brown. Low plasticity. Sand, fine. Gravel, fine, subangular to subrounded.				D	F-St	
			End of Hole Depth: 0.3 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

0.5

1.0

1.5

Hand auger met practical refusal at 0.3 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.4 m depth.
Standing groundwater was not encountered.
TS = TOPSOIL

LOG OF AUGER HA04

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 22/11/2019
Hole Depth : 0.3 m
Hole Diameter : 50 mm

Shear Vane No : 1379
Logged By : KF/CR
Reviewed By : JW
Latitude : -43.626238
Longitude : 172.376311

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Scala Penetrometer Blows per 100mm
	TS	ML	SILT with some sand and trace rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].					S-F		
	ALLUVIUM	ML	Sandy SILT with trace gravel; greyish brown. Low plasticity. Sand, fine. Gravel, fine, subangular to subrounded.				D	St-VSt		
			End of Hole Depth: 0.3 m Termination Condition: Practical refusal							

Scala Penetrometer: Blows per 100mm — 2, 4, 6, 8, 10, 12; >> at 0.3 m

0.5

1.0

1.5

Hand auger met practical refusal at 0.3 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered.
TS = TOPSOIL

GEOTECH HAND AUGER 2019.11.27 - HAND AUGER LOGS.GPJ NZ DATA TEMPLATE 2.GDT 4/12/19

LOG OF AUGER HA05

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 22/11/2019
Hole Depth : 0.2 m
Hole Diameter : 50 mm

Shear Vane No : 1379
Logged By : KF/CR
Reviewed By : JW
Latitude : -43.625776
Longitude : 172.377469

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TS	ML	SILT with some sand and trace rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				D	S-F	
	A	ML	Sandy SILT with trace gravel; greyish brown. Low plasticity. Sand, fine. Gravel, fine, subangular to subrounded.					St-VSt	
			End of Hole Depth: 0.2 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

0.5

1.0

1.5

Hand auger met practical refusal at 0.2 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered.
TS = TOPSOIL, A = ALLUVIUM

LOG OF AUGER HA06

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 22/11/2019
Hole Depth : 0.2 m
Hole Diameter : 50 mm

Shear Vane No : 1379
Logged By : KF/CR
Reviewed By : JW
Latitude : -43.625827
Longitude : 172.378467

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TS	ML	SILT with some sand and trace rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				D	F-St	
	A	ML	SILT with some sand; brown. Low plasticity. Sand, fine.					St-VSt	
			End of Hole Depth: 0.2 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

0.5

1.0

1.5

Hand auger met practical refusal at 0.2 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.4 m depth.
Standing groundwater was not encountered.
TS = TOPSOIL, A = ALLUVIUM

LOG OF AUGER HA07

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 22/11/2019
Hole Depth : 0.2 m
Hole Diameter : 50 mm

Shear Vane No : 1379
Logged By : KF/CR
Reviewed By : JW
Latitude : -43.626312
Longitude : 172.378918

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TS	ML	SILT with some sand and trace rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				D	F-St	
	A	ML	SILT with some sand; brown. Low plasticity. Sand, fine.					St-VSt	
			End of Hole Depth: 0.2 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

0.5

1.0

1.5

Hand auger met practical refusal at 0.2 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered.
TS = TOPSOIL, A = ALLUVIUM

LOG OF AUGER HA08

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 22/11/2019
Hole Depth : 0.4 m
Hole Diameter : 50 mm

Shear Vane No : 1379
Logged By : KF/CR
Reviewed By : JW
Latitude : -43.626009
Longitude : 172.379583

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TS	ML	SILT with some sand and trace rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].					F-St	
	ALLUVIUM	ML	SILT with some sand; greyish brown. Low plasticity. Sand, fine. Becomes brownish grey and trace gravel encountered from 0.3 m depth.				D	VSt-H	
0.5			End of Hole Depth: 0.4 m Termination Condition: Practical refusal						
1.0									
1.5									

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.4 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.6 m depth.
Standing groundwater was not encountered.
TS = TOPSOIL

LOG OF AUGER HA09

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 22/11/2019
Hole Depth : 0.3 m
Hole Diameter : 50 mm

Shear Vane No : 1379
Logged By : KF/CR
Reviewed By : JW
Latitude : -43.62663
Longitude : 172.378167

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TS	ML	SILT with some sand and trace rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].					St	
	ALLUVIUM	ML	SILT with some sand; greyish brown. Low plasticity. Sand, fine.				D	St-VSt	
			End of Hole Depth: 0.3 m Termination Condition: Practical refusal						
0.5									
1.0									
1.5									

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.3 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered.
TS = TOPSOIL

GEOTECH HAND AUGER 2019.11.27 - HAND AUGER LOGS.GPJ NZ DATA TEMPLATE 2.GDT 4/12/19

LOG OF AUGER HA10

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 22/11/2019
Hole Depth : 0.5 m
Hole Diameter : 50 mm

Shear Vane No : 1379
Logged By : KF/CR
Reviewed By : JW
Latitude : -43.626452
Longitude : 172.377126

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TS	ML	SILT with some sand and trace rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].					F-St	
	ALLUVIUM	ML	SILT with some sand; greyish brown. Low plasticity. Sand, fine. Trace gravel and sand observed from 0.3 m depth.				D	St-VSt	
0.5			End of Hole Depth: 0.5 m Termination Condition: Practical refusal						
1.0									
1.5									

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.5 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.7 m depth.
Standing groundwater was not encountered.
TS = TOPSOIL

GEOTECH HAND AUGER 2019.11.27 - HAND AUGER LOGS.GPJ NZ DATA TEMPLATE 2.GDT 4/12/19

LOG OF AUGER HA11

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 22/11/2019
Hole Depth : 0.3 m
Hole Diameter : 50 mm

Shear Vane No : 1379
Logged By : KF/CR
Reviewed By : JW
Latitude : -43.627174
Longitude : 172.37697

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TS	ML	SILT with some sand and trace rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].					F-St	
	ALLUVIUM	ML	SILT with some sand and trace gravel; greyish brown. Low plasticity. Sand, fine.				D	St-VSt	
			End of Hole Depth: 0.3 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

0.5

1.0

1.5

Hand auger met practical refusal at 0.3 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered.
TS = TOPSOIL

LOG OF AUGER HA12

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 22/11/2019
Hole Depth : 0.3 m
Hole Diameter : 50 mm

Shear Vane No : 1379
Logged By : KF/CR
Reviewed By : JW
Latitude : -43.626972
Longitude : 172.375908

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TS	ML	SILT with some sand and trace rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].					F-St	
	ALLUVIUM	ML	SILT with some sand and trace gravel; greyish brown. Low plasticity. Sand, fine.				D	St-VSt	
			End of Hole Depth: 0.3 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

0.5

1.0

1.5

Hand auger met practical refusal at 0.3 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered.
TS = TOPSOIL

LOG OF AUGER HA13

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 22/11/2019
Hole Depth : 0.3 m
Hole Diameter : 50 mm

Shear Vane No : 1379
Logged By : KF/CR
Reviewed By : JW
Latitude : -43.627741
Longitude : 172.375608

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TS	ML	SILT with some sand and trace rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].					F-St	
	ALLUVIUM	ML	Sandy SILT with minor gravel; greyish brown. Low plasticity. Sand, fine. Gravel, fine, subangular to subrounded.				D	St-VSt	
			End of Hole Depth: 0.3 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

0.5

1.0

1.5

Hand auger met practical refusal at 0.3 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered.
TS = TOPSOIL

LOG OF AUGER HA14

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 22/11/2019
Hole Depth : 0.4 m
Hole Diameter : 50 mm

Shear Vane No : 1379
Logged By : KF/CR
Reviewed By : JW
Latitude : -43.62757
Longitude : 172.374573

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TS	ML	SILT with some sand and trace rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].					S-F	
	ALLUVIUM	ML	Sandy SILT with trace gravel; greyish brown. Low plasticity. Sand, fine.				D	St-VSt	
			End of Hole Depth: 0.4 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

0.5

1.0

1.5

Hand auger met practical refusal at 0.4 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.4 m depth.
Standing groundwater was not encountered.
TS = TOPSOIL

LOG OF AUGER HA15

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 22/11/2019
Hole Depth : 0.5 m
Hole Diameter : 50 mm

Shear Vane No : 1379
Logged By : KF/CR
Reviewed By : JW
Latitude : -43.628288
Longitude : 172.374337

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TS	ML	SILT with some sand and trace rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].					S-F	
	ALLUVIUM	ML	Sandy SILT with trace gravel; greyish brown. Low plasticity. Sand, fine.				D	F-VSt	
0.5			Trace gravel and becomes brownish grey from 0.3 m depth.						
			End of Hole Depth: 0.5 m Termination Condition: Practical refusal						
1.0									
1.5									

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.5 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.6 m depth.
Standing groundwater was not encountered.
TS = TOPSOIL

GEOTECH HAND AUGER 2019.11.27 - HAND AUGER LOGS.GPJ NZ DATA TEMPLATE 2.GDT 4/12/19

LOG OF AUGER HA16

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 22/11/2019
Hole Depth : 0.6 m
Hole Diameter : 50 mm

Shear Vane No : 1379
Logged By : KF/CR
Reviewed By : JW
Latitude : -43.629139
Longitude : 172.375002

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TS	ML	SILT with some sand and trace rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].					S-F	
	ALLUVIUM	ML	Sandy SILT; greyish brown. Low plasticity. Sand, fine.				D	F-VSt	
0.5			Becomes light greyish brown from 0.3 m depth.						
			Trace gravel encountered from 0.5 m depth.						
			End of Hole Depth: 0.6 m Termination Condition: Practical refusal						
1.0									
1.5									

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.6 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.7 m depth.
Standing groundwater was not encountered.
TS = TOPSOIL

LOG OF AUGER HA17

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 22/11/2019
Hole Depth : 0.3 m
Hole Diameter : 50 mm

Shear Vane No : 1379
Logged By : KF/CR
Reviewed By : JW
Latitude : -43.628389
Longitude : 172.375254

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TS	ML	SILT with some sand and trace rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].					S-F	
	ALLUVIUM	ML	Sandy SILT; greyish brown. Low plasticity. Sand, fine.				D	St-VSt	
			End of Hole Depth: 0.3 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

0.5

1.0

1.5

Hand auger met practical refusal at 0.3 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered.
TS = TOPSOIL

LOG OF AUGER HA18

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 22/11/2019
Hole Depth : 0.1 m
Hole Diameter : 50 mm

Shear Vane No : 1379
Logged By : KF/CR
Reviewed By : JW
Latitude : -43.628587
Longitude : 172.376257

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TS	ML	SILT with some sand and trace rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				D	F-St	
			End of Hole Depth: 0.1 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

0.5

1.0

1.5

Hand auger met practical refusal at 0.1 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered.
TS = TOPSOIL

LOG OF AUGER HA19

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 22/11/2019
Hole Depth : 0.6 m
Hole Diameter : 50 mm

Shear Vane No : 1379
Logged By : KF/CR
Reviewed By : JW
Latitude : -43.627815
Longitude : 172.376568

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TS	ML	SILT with some sand and trace rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].					S-F	
	ALLUVIUM	ML	SILT with some sand; greyish brown. Low plasticity. Sand, fine.				D	F-St	
0.5		ML	Sandy SILT with trace gravel; greyish brown. Low plasticity. Sand, fine.					St-VSt	
			End of Hole Depth: 0.6 m Termination Condition: Practical refusal						
1.0									
1.5									

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.6 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.6 m depth.
Standing groundwater was not encountered.
TS = TOPSOIL

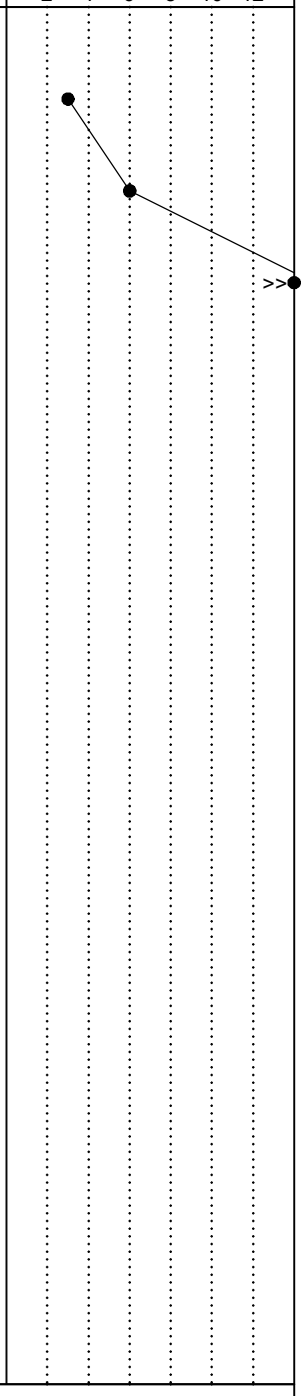
LOG OF AUGER HA20

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 22/11/2019
Hole Depth : 0.3 m
Hole Diameter : 50 mm

Shear Vane No : 1379
Logged By : KF/CR
Reviewed By : JW
Latitude : -43.627993
Longitude : 172.377662

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TS	ML	SILT with some sand and trace rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].					S-F	
	ALLUVIUM	ML	SILT with some sand and trace gravel; greyish brown. Low plasticity. Sand, fine.				D	St-VSt	
			End of Hole Depth: 0.3 m Termination Condition: Practical refusal						



0.5

1.0

1.5

Hand auger met practical refusal at 0.3 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered.
TS = TOPSOIL

LOG OF AUGER HA21

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 22/11/2019
Hole Depth : 0.2 m
Hole Diameter : 50 mm

Shear Vane No : 1379
Logged By : KF/CR
Reviewed By : JW
Latitude : -43.627255
Longitude : 172.377872

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TOPSOIL	ML	SILT with some sand and trace rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				D	F-St	
			End of Hole Depth: 0.2 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

0.5

1.0

1.5

Hand auger met practical refusal at 0.2 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered.

GEOTECH HAND AUGER 2019.11.27 - HAND AUGER LOGS.GPJ NZ DATA TEMPLATE 2.GDT 4/12/19

LOG OF AUGER HA22

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 22/11/2019
Hole Depth : 0.3 m
Hole Diameter : 50 mm

Shear Vane No : 1379
Logged By : KF/CR
Reviewed By : JW
Latitude : -43.627454
Longitude : 172.378955

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TS	ML	SILT with some sand and trace rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].					F-St	
	ALLUVIUM	ML	SILT with some sand and trace gravel; greyish brown. Low plasticity. Sand, fine.				D	St-VSt	
			End of Hole Depth: 0.3 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

0.5

1.0

1.5

Hand auger met practical refusal at 0.3 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered.
TS = TOPSOIL

LOG OF AUGER HA23

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 22/11/2019
Hole Depth : 0.3 m
Hole Diameter : 50 mm

Shear Vane No : 1379
Logged By : KF/CR
Reviewed By : JW
Latitude : -43.629267
Longitude : 172.37593

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TS	ML	SILT with some sand and trace rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].					S-F	
	ALLUVIUM	ML	Sandy SILT with trace gravel; brown. Low plasticity. Sand, fine.				D	St-VSt	
			End of Hole Depth: 0.3 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

0.5

1.0

1.5

Hand auger met practical refusal at 0.3 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered.
TS = TOPSOIL

LOG OF AUGER HA24

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 22/11/2019
Hole Depth : 0.3 m
Hole Diameter : 50 mm

Shear Vane No : 1379
Logged By : KF/CR
Reviewed By : JW
Latitude : -43.629275
Longitude : 172.377732

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TS	ML	SILT with some sand and trace rootlets; brown. Low plasticity [TOPSOIL].					S-F	
	ALLUVIUM	ML	Sandy SILT with minor gravel; brown. Low plasticity. Sand, fine. Gravel, fine, subangular to subrounded.				D	St-VSt	
			End of Hole Depth: 0.3 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

0.5

1.0

1.5

Hand auger met practical refusal at 0.3 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered.
TS = TOPSOIL

LOG OF AUGER HA25

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 22/11/2019
Hole Depth : 0.1 m
Hole Diameter : 50 mm

Shear Vane No : 1379
Logged By : KF/CR
Reviewed By : JW
Latitude : -43.628692
Longitude : 172.379095

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TS	ML	SILT with some sand and trace rootlets; brown. Low plasticity [TOPSOIL].				D	F-St	
			End of Hole Depth: 0.1 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

0.5

>>

1.0

1.5

Hand auger met practical refusal at 0.1 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.5 m depth.
Standing groundwater was not encountered.
TS = TOPSOIL

GEOTECH HAND AUGER 2019.11.27 - HAND AUGER LOGS.GPJ NZ DATA TEMPLATE 2.GDT 4/12/19

LOG OF AUGER HA26

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 22/11/2019
Hole Depth : 0.2 m
Hole Diameter : 50 mm

Shear Vane No : 1379
Logged By : KF/CR
Reviewed By : JW
Latitude : -43.629562
Longitude : 172.378456

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TOPSOIL	ML	SILT with some sand and trace gravel; brown. Low plasticity. Sand, fine [TOPSOIL].				D	F-St	
			End of Hole Depth: 0.2 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

0.5

1.0

1.5

Hand auger met practical refusal at 0.2 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered.

LOG OF AUGER HA27

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 22/11/2019
Hole Depth : 0.1 m
Hole Diameter : 50 mm

Shear Vane No : 1379
Logged By : KF/CR
Reviewed By : JW
Latitude : -43.62955
Longitude : 172.377029

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Scala Penetrometer Blows per 100mm
	TS	ML	SILT with some sand, trace gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				D	S-F		
			End of Hole Depth: 0.1 m Termination Condition: Practical refusal							

Scala Penetrometer: Blows per 100mm — 2, 4, 6, 8, 10, 12; >> at 0.3 m depth

0.5

1.0

1.5

Hand auger met practical refusal at 0.1 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered.
TS = TOPSOIL

GEOTECH HAND AUGER 2019.11.27 - HAND AUGER LOGS.GPJ NZ DATA TEMPLATE 2.GDT 4/12/19

LOG OF AUGER HA28

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 22/11/2019
Hole Depth : 0.2 m
Hole Diameter : 50 mm

Shear Vane No : 1379
Logged By : KF/CR
Reviewed By : JW
Latitude : -43.630284
Longitude : 172.376702

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TS	ML	SILT with some sand and trace rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				D	S-F	
	A	ML	Sandy SILT with trace gravel; brownish grey. Low plasticity. Sand, fine.					VSt-H	
			End of Hole Depth: 0.2 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

0.5

1.0

1.5

Hand auger met practical refusal at 0.2 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.2 m depth.
Standing groundwater was not encountered.
TS = TOPSOIL, A = ALLUVIUM

LOG OF AUGER HA29

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 22/11/2019
Hole Depth : 0.2 m
Hole Diameter : 50 mm

Shear Vane No : 1379
Logged By : KF/CR
Reviewed By : JW
Latitude : -43.630074
Longitude : 172.375758

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TS	ML	SILT with some sand and trace rootlets; brown. Low plasticity. Sand fine [TOPSOIL].						
	A	ML	Sandy SILT with trace gravel; brown. Low plasticity. Sand, fine.						
			End of Hole Depth: 0.2 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

0.5

1.0

1.5

Hand auger met practical refusal at 0.2 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered.
TS = TOPSOIL, A = ALLUVIUM

LOG OF AUGER HA30

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 22/11/2019
Hole Depth : 0.4 m
Hole Diameter : 50 mm

Shear Vane No : 1379
Logged By : KF/CR
Reviewed By : JW
Latitude : -43.63101
Longitude : 172.376531

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TS	ML	SILT with some sand and trace rootlets; brown. Low plasticity. Sand fine [TOPSOIL].					S-F	
	ALLUVIUM	ML	Sandy SILT with minor gravel; greyish brown. Low plasticity. Sand, fine. Gravel, fine to medium, subangular to subrounded.				D	St-VSt	
			End of Hole Depth: 0.4 m Termination Condition: Practical refusal						
0.5									
1.0									
1.5									

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.4 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered.
TS = TOPSOIL

GEOTECH HAND AUGER 2019.11.27 - HAND AUGER LOGS.GPJ NZ DATA TEMPLATE 2.GDT 4/12/19

LOG OF AUGER HA31

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 22/11/2019
Hole Depth : 0.3 m
Hole Diameter : 50 mm

Shear Vane No : 1379
Logged By : KF/CR
Reviewed By : JW
Latitude : -43.630521
Longitude : 172.37778

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TS	ML	SILT with some sand and trace rootlets; brown. Low plasticity. Sand fine [TOPSOIL].					F-St	
	ALLUVIUM	ML	Sandy SILT with trace gravel; greyish brown. Low plasticity. Sand, fine.				D	St-H	
			End of Hole Depth: 0.3 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

0.5

1.0

1.5

Hand auger met practical refusal at 0.3 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered.
TS = TOPSOIL

LOG OF AUGER HA32

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 22/11/2019
Hole Depth : 0.3 m
Hole Diameter : 50 mm

Shear Vane No : 1379
Logged By : KF/CR
Reviewed By : JW
Latitude : -43.631356
Longitude : 172.377566

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TS	ML	SILT with some sand and trace rootlets; brown. Low plasticity. Sand fine [TOPSOIL].					S-F	
	ALLUVIUM	ML	Sandy SILT with trace gravel; greyish brown. Low plasticity. Sand, fine.				D	St-VSt	
			End of Hole Depth: 0.3 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

0.5

1.0

1.5

Hand auger met practical refusal at 0.3 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered.
TS = TOPSOIL

LOG OF AUGER HA33

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 22/11/2019
Hole Depth : 0.6 m
Hole Diameter : 50 mm

Shear Vane No : 1379
Logged By : KF/CR
Reviewed By : JW
Latitude : -43.632691
Longitude : 172.377909

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TOPSOIL	ML	SILT with some sand and trace rootlets; brown. Low plasticity. Sand fine [TOPSOIL].					F-St	
0.5	ALLUVIUM	ML	Sandy SILT with trace gravel; greyish brown. Low plasticity. Sand, fine. Gravel becomes minor from 0.5 m depth. Gravel, fine to medium, subangular to subrounded.				D	VSt-H	
			End of Hole Depth: 0.6 m Termination Condition: Practical refusal						
1.0									
1.5									

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.6 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.6 m depth.
Standing groundwater was not encountered.

LOG OF AUGER HA34

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 06/12/2019
Hole Depth : 0.3 m
Hole Diameter : 50 mm

Shear Vane No : 1379
Logged By : KF/MK
Reviewed By : JW
Latitude : -43.625477
Longitude : 172.376421

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TOPSOIL	ML	SILT with some sand and trace rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].					F-St	
	ALLUVIUM	ML	Sandy SILT with trace gravel; greyish brown. Low plasticity. Sand, fine.				D	St-H	
			End of Hole Depth: 0.3 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

0.5

1.0

Hand auger met practical refusal at 0.3 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered.

LOG OF AUGER HA35

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 06/12/2019
Hole Depth : 0.1 m
Hole Diameter : 50 mm

Shear Vane No : 1379
Logged By : KF/MK
Reviewed By : JW
Latitude : -43.625997
Longitude : 172.375209

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TOPSOIL	ML	SILT with some sand and trace rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				D	F-St	
			End of Hole Depth: 0.1 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

0.5

1.0

>>

Hand auger met practical refusal at 0.1 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered.

LOG OF AUGER HA36

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 06/12/2019
Hole Depth : 0.3 m
Hole Diameter : 50 mm

Shear Vane No : 1379
Logged By : KF/MK
Reviewed By : JW
Latitude : -43.626541
Longitude : 172.373835

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TOPSOIL	ML	SILT with some sand and trace rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].					F-St	
	ALLUVIUM	ML	Sandy SILT with minor gravel; greyish brown. Low plasticity. Sand, fine. Gravel, fine, subangular to subrounded.				D	VSt-H	
0.5			End of Hole Depth: 0.3 m Termination Condition: Practical refusal						
1.0									

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.3 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered.

LOG OF AUGER HA37

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 06/12/2019
Hole Depth : 0.4 m
Hole Diameter : 50 mm

Shear Vane No : 1379
Logged By : KF/MK
Reviewed By : JW
Latitude : -43.625788
Longitude : 172.374136

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TOPSOIL	ML	SILT with some sand and trace rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].					F-St	
	ALLUVIUM	ML	Sandy SILT with trace gravel; greyish brown. Low plasticity. Sand, fine. Gravel becomes minor from 0.3 m depth. Gravel, fine, subrounded to rounded.				D	VSt-H	
0.5			End of Hole Depth: 0.4 m Termination Condition: Practical refusal						
1.0									

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.4 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered.

LOG OF AUGER HA38

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 06/12/2019
Hole Depth : 0.4 m
Hole Diameter : 50 mm

Shear Vane No : 1379
Logged By : KF/MK
Reviewed By : JW
Latitude : -43.625065
Longitude : 172.374372

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0.0	TOPSOIL	ML	SILT with some sand and trace rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				D	F-St	
0.3	ALLUVIUM	ML	Sandy SILT with trace gravel; greyish brown. Low plasticity. Sand, fine.					St-VSt	
0.4			End of Hole Depth: 0.4 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.4 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.4 m depth.
Standing groundwater was not encountered.

GEOTECH HAND AUGER 2019.12.XX - REMAINING HA LOGS.GPJ NZ DATA TEMPLATE 2.GDT 12/12/19

LOG OF AUGER HA39

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 06/12/2019
Hole Depth : 0.2 m
Hole Diameter : 50 mm

Shear Vane No : 1379
Logged By : KF/MK
Reviewed By : JW
Latitude : -43.625291
Longitude : 172.375434

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TOPSOIL	ML	SILT with some sand and trace rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				D	F-St	
	A	ML	Sandy SILT with trace gravel; greyish brown. Low plasticity. Sand, fine.					VSt-H	
			End of Hole Depth: 0.2 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

0.5

1.0

Hand auger met practical refusal at 0.2 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.2 m depth.
Standing groundwater was not encountered.
A = ALLUVIUM

LOG OF AUGER HA40

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 06/12/2019
Hole Depth : 0.4 m
Hole Diameter : 50 mm

Shear Vane No : 1379
Logged By : KF/MK
Reviewed By : JW
Latitude : -43.624561
Longitude : 172.375659

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TOPSOIL	ML	SILT with some sand and trace rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].					F-St	
	ALLUVIUM	ML	Sandy SILT with trace gravel and rootlets; greyish brown. Low plasticity. Sand, fine. No rootlets encountered from 0.3 m depth.				D	VSt-H	
0.5			End of Hole Depth: 0.4 m Termination Condition: Practical refusal						
1.0									

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.4 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.4 m depth.
Standing groundwater was not encountered.

LOG OF AUGER HA41

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 06/12/2019
Hole Depth : 0.2 m
Hole Diameter : 50 mm

Shear Vane No : 1379
Logged By : KF/MK
Reviewed By : JW
Latitude : -43.624739
Longitude : 172.376636

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TOPSOIL	ML	SILT with some sand, trace gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].					St-VSt	
	A	ML	Sandy SILT with trace gravel and rootlets; greyish brown. Low plasticity. Sand, fine.				D	VSt-H	
			End of Hole Depth: 0.2 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

0.5

1.0

Hand auger met practical refusal at 0.2 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.4 m depth.
Standing groundwater was not encountered.
A = ALLUVIUM

GEOTECH HAND AUGER 2019.12.XX - REMAINING HA LOGS.GPJ NZ DATA TEMPLATE 2.GDT 12/12/19

LOG OF TEST PIT TP01

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 25/11/2019
Max Test Pit Depth : 2 m
Digger Type/Size : 24 Tonne
Bucket Type/Size : Bucket Excavator
Shear Vane No : N/A
Logged By : KF
Reviewed By : JW
Latitude : -43.626724
Longitude : 172.37925

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0	T		ML	Sandy SILT with trace gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				M	F-St		2 4 6 8 10 12
0.5	ALLUVIUM			Sandy fine to medium GRAVEL with some silt and trace rootlets; greyish brown with orange mottles. Well graded, subangular to subrounded. Sand, fine.							
				Silt becomes trace and no rootlets from 0.5 m depth.							
1.0			GW	Trace cobbles encountered from 0.9 m depth.				M	MD-D		
				Cobbles become minor from 1.3 m depth.							
1.5											
2.0				Depth of Excavation: 2 m Termination Condition: Target depth							

Test pit met target depth
Scala Penetrometer met practical refusal.
Standing groundwater was not encountered.

T = TOPSOIL

GEOTECH TEST PIT LOG 2019.11.27 - TEST PIT LOGS.GPJ NZ MASTER DATA TEMPLATE.GDT 4/12/19

LOG OF TEST PIT TP02

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 25/11/2019
Max Test Pit Depth : 2 m
Digger Type/Size : 24 Tonne
Bucket Type/Size : Bucket Excavator

Shear Vane No : N/A
Logged By : KF
Reviewed By : JW
Latitude : -43.625528
Longitude : 172.379116

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
0	TS		ML	SILT with some sand and tree roots; light brownish grey. Low plasticity. Sand, fine [TOPSOIL].					F-St		
0.5	ALLUVIUM		GW	Sandy fine to coarse GRAVEL with some silt and trace rootlets; brownish grey. Well graded, subangular to subrounded. Sand, fine to medium.				D	MD-D		>>
1.0				Trace cobbles and silt encountered from 0.6 m depth.							
1.5				No rootlets observed from 1.0 m depth.				M			
2.0				Cobbles become minor from 1.6 m depth.							
				Depth of Excavation: 2 m Termination Condition: Target depth							

Test pit met target depth
Scala Penetrometer met practical refusal.
Standing groundwater was not encountered.

TS = TOPSOIL

LOG OF TEST PIT TP03

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 25/11/2019
Max Test Pit Depth : 1.9 m
Digger Type/Size : 24 Tonne
Bucket Type/Size : Bucket Excavator
Shear Vane No : N/A
Logged By : KF
Reviewed By : JW
Latitude : -43.625939
Longitude : 172.372464

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0	TOPSOIL		ML	Sandy SILT with trace gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				D	St-VSt		
0.5	ALLUVIUM		SM	Silty fine to medium SAND with some gravel and trace rootlets; greyish brown. Well graded. Gravel, fine to medium, subangular to subrounded.				M	MD-D		
1.0			GW	Sandy fine to coarse GRAVEL with trace silt; grey. Well graded, subangular to subrounded. Sand, fine to coarse.					MD-D		
1.5				Trace cobbles encountered from 1.7 m depth.							
2.0				Depth of Excavation: 1.9 m Termination Condition: Target depth							

Scala Penetrometer: Blows per 100mm — 2 4 6 8 10 12

Test pit met target depth
Scala Penetrometer met practical refusal.
Standing groundwater was not encountered.

Noticeable sand increase from 0.8 m depth.

LOG OF TEST PIT TP04

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 25/11/2019
Max Test Pit Depth : 2 m
Digger Type/Size : 24 Tonne
Bucket Type/Size : Bucket Excavator

Shear Vane No : N/A
Logged By : KF
Reviewed By : JW
Latitude : -43.6271
Longitude : 172.374267

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0	TS		ML	SILT with some sand, trace gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				D	F-St		
	ALLUVIUM		GW	Sandy fine to medium GRAVEL with some silt and trace rootlets; greyish brown. Well graded, subangular to subrounded.					MD-D		
0.5			SM	Silty fine to medium SAND with minor gravel; greyish brown. Well graded. Gravel, fine to medium, subangular to subrounded.					MD-D		
1.0			GW	Sandy fine to coarse GRAVEL with trace cobbles; grey. Well graded, subangular to subrounded. Sand, fine to coarse.				M	MD-D		
1.5											
2.0				Depth of Excavation: 2 m Termination Condition: Target depth							

Scala Penetrometer: Blows per 100mm — 2 4 6 8 10 12 (>>)

Test pit met target depth
Scala Penetrometer met practical refusal.
Standing groundwater was not encountered.

TS = TOPSOIL
Noticeable sand increase from 0.9 m depth.

LOG OF TEST PIT TP05

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 25/11/2019
Max Test Pit Depth : 1.8 m
Digger Type/Size : 24 Tonne
Bucket Type/Size : Bucket Excavator
Shear Vane No : N/A
Logged By : KF
Reviewed By : JW
Latitude : -43.626522
Longitude : 172.375592

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier – Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
0.0	TS		ML	SILT with some sand, trace gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				D	F-St		>>
0.5	ALLUVIUM		GW	Sandy fine to coarse GRAVEL with some silt and trace rootlets; greyish brown. Well graded, subangular to subrounded. Sand, fine to medium.				M	MD-D		
				Trace cobbles and silt encountered from 0.6 m depth.							
1.0				No rootlets observed from 0.9 m depth.							
1.5				Becomes grey from 1.4 m depth.							
				Cobbles become minor from 1.7 m depth.							
2.0				Depth of Excavation: 1.8 m Termination Condition: Target depth							

Test pit met target depth
Scala Penetrometer met practical refusal.
Standing groundwater was not encountered.

TS = TOPSOIL

GEOTECH TEST PIT LOG 2019.11.27 - TEST PIT LOGS.GPJ NZ MASTER DATA TEMPLATE.GDT 4/12/19

LOG OF TEST PIT TP06

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 25/11/2019
Max Test Pit Depth : 1.9 m
Digger Type/Size : 24 Tonne
Bucket Type/Size : Bucket Excavator

Shear Vane No : N/A
Logged By : KF
Reviewed By : JW
Latitude : -43.626028
Longitude : 172.376879

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0	TS		ML	SILT with some sand, trace gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				D	F-St		2 4 6 8 10 12
0.5	ALLUVIUM		GW	Sandy fine to coarse GRAVEL with some silt and trace rootlets; greyish brown. Well graded, subangular to subrounded. Sand, fine to medium. No silt encountered from 0.4 m depth.				M	MD-D		>>
1.0				Cobbles become minor from 0.9 m depth.							
1.5				Sand becomes some from 1.2 m depth.							
2.0				No rootlets observed from 1.6 m depth.							
				Depth of Excavation: 1.9 m Termination Condition: Target depth							

Test pit met target depth
Scala Penetrometer met practical refusal.
Standing groundwater was not encountered.

TS = TOPSOIL

LOG OF TEST PIT TP07

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 25/11/2019
Max Test Pit Depth : 1.8 m
Digger Type/Size : 24 Tonne
Bucket Type/Size : Bucket Excavator

Shear Vane No : N/A
Logged By : KF
Reviewed By : JW
Latitude : -43.626164
Longitude : 172.377786

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
0	TS		ML	SILT with some sand, trace gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				D	F-St		
0.5	ALLUVIUM		GW	Sandy fine to coarse GRAVEL with some silt and trace cobbles; greyish brown. Well graded, subangular to subrounded. Sand, fine to medium. Cobbles become minor from 0.6 m depth. Sand becomes some from 0.8 m depth.				M	MD-D		>>
1.0											
1.5											
2.0				Depth of Excavation: 1.8 m Termination Condition: Target depth							

Test pit met target depth
Scala Penetrometer met practical refusal.
Standing groundwater was not encountered.

TS = TOPSOIL

LOG OF TEST PIT TP08

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 25/11/2019
Max Test Pit Depth : 1.8 m
Digger Type/Size : 24 Tonne
Bucket Type/Size : Bucket Excavator
Shear Vane No : N/A
Logged By : KF
Reviewed By : JW
Latitude : -43.626906
Longitude : 172.377587

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0	TS		ML	SILT with some sand, trace gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				D	F-St		
0.5	ALLUVIUM		GW	Sandy fine to coarse GRAVEL with some silt, trace cobbles and rootlets; greyish brown. Well graded, subangular to subrounded. Sand, fine to coarse. No rootlets observed from 0.4 m depth.				M	MD-D		
1.0				Becomes grey and some sand from 1.2 m depth.							
1.5											
2.0				Depth of Excavation: 1.8 m Termination Condition: Target depth							

Scala Penetrometer: Blows per 100mm — 2 4 6 8 10 12 (>>)

Test pit met target depth
Scala Penetrometer met practical refusal.
Standing groundwater was not encountered.

TS = TOPSOIL

LOG OF TEST PIT TP09

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 25/11/2019
Max Test Pit Depth : 2 m
Digger Type/Size : 24 Tonne
Bucket Type/Size : Bucket Excavator
Shear Vane No : N/A
Logged By : KF
Reviewed By : JW
Latitude : -43.626677
Longitude : 172.376622

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0	TS		ML	Sandy SILT with trace gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				D	F-St		4
0.5	ALLUVIUM		GW	Sandy fine to medium GRAVEL with some silt and trace rootlets; greyish brown. Well graded, subangular to subrounded. Sand, fine to medium. No silt encountered from 0.6 m depth. Trace cobbles encountered from 0.8 m depth.				M	MD-D		8
1.5			GW	Sandy fine to coarse GRAVEL with trace cobbles; grey. Well graded, subangular to subrounded. Sand, fine to coarse.					MD-D		>>
2.0				Depth of Excavation: 2 m Termination Condition: Target depth							

Test pit met target depth
Scala Penetrometer met practical refusal.
Standing groundwater was not encountered.

TS = TOPSOIL
Noticeable sand increase from 1.7 m depth.

LOG OF TEST PIT TP10

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 25/11/2019
Max Test Pit Depth : 1.9 m
Digger Type/Size : 24 Tonne
Bucket Type/Size : Bucket Excavator
Shear Vane No : N/A
Logged By : KF
Reviewed By : JW
Latitude : -43.627457
Longitude : 172.376289

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0	TOPSOIL		ML	Sandy SILT with trace gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				D	St-VSt		
0.5	ALLUVIUM		GW	Sandy fine to coarse GRAVEL with trace silt; greyish brown. Well graded, subangular to subrounded. Sand, fine to coarse. No silt and trace cobbles encountered from 0.6 m depth. Sand becomes some from 1.0 m depth.				M	MD-D		
1.0											
1.5											
2.0				Depth of Excavation: 1.9 m Termination Condition: Target depth							

Scala Penetrometer: Blows per 100mm — 2 4 6 8 10 12

Test pit met target depth
Scala Penetrometer met practical refusal.
Standing groundwater was not encountered.

GEOTECH TEST PIT LOG 2019.11.27 - TEST PIT LOGS.GPJ NZ MASTER DATA TEMPLATE.GDT 4/12/19

LOG OF TEST PIT TP11

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 26/11/2019
Max Test Pit Depth : 1.9 m
Digger Type/Size : 24 Tonne
Bucket Type/Size : Bucket Excavator
Shear Vane No : N/A
Logged By : KF
Reviewed By : JW
Latitude : -43.627275
Longitude : 172.375259

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0	TS		ML	SILT with some sand, trace gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].					F-St		
			GW	Sandy fine to medium GRAVEL with some silt and trace rootlets; greyish brown. Well graded, subangular to subrounded. Sand, fine to medium.				D	MD-D		
0.5	ALLUVIUM		ML	SILT with some sand and trace gravel; brownish grey. Low plasticity. Sand, fine.					St-VSt		
			GW	Sandy fine to coarse GRAVEL with some silt; greyish brown with orange mottles. Well graded, subangular to subrounded. Sand, fine to medium. No silt encountered from 0.8 m depth.							
1.0				Sand becomes fine to coarse from 1.0 m depth.							
				Trace cobbles encountered from 1.2 m depth.				M	MD-D		
1.5				Sand becomes some from 1.8 m depth.							
2.0				Depth of Excavation: 1.9 m Termination Condition: Target depth							

Test pit met target depth
Scala Penetrometer met practical refusal.
Standing groundwater was not encountered.

TS = TOPSOIL

LOG OF TEST PIT TP12

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 26/11/2019
Max Test Pit Depth : 2 m
Digger Type/Size : 24 Tonne
Bucket Type/Size : Bucket Excavator

Shear Vane No : N/A
Logged By : KF
Reviewed By : JW
Latitude : -43.628017
Longitude : 172.374975

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0	TS		ML	SILT with some sand, trace gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].					F-St		
	ALLUVIUM		GW	Fine to medium GRAVEL with some sand, silt and trace rootlets; greyish brown. Well graded, subangular to subrounded. Sand, fine.				D	MD-D		
0.5				Sandy fine to coarse GRAVEL with trace rootlets; grey. Well graded, subangular to subrounded. Sand, fine to coarse.							
				No rootlets observed from 0.8 m depth.				M			
1.0				Trace cobbles encountered from 1.0 m depth.							
			GW						MD-D		
1.5				Cobbles become minor from 1.5 m depth.							
								W			
2.0				Depth of Excavation: 2 m Termination Condition: Target depth							

Scala Penetrometer: 2 4 6 8 10 12 >>

Test pit met target depth
Scala Penetrometer met practical refusal.
Standing groundwater was not encountered.

TS = TOPSOIL

LOG OF TEST PIT TP13

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 26/11/2019
Max Test Pit Depth : 2 m
Digger Type/Size : 24 Tonne
Bucket Type/Size : Bucket Excavator
Shear Vane No : N/A
Logged By : KF
Reviewed By : JW
Latitude : -43.627819
Longitude : 172.373988

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0.0	TS		ML	SILT with some sand, trace gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].					F-St		
0.5	ALLUVIUM		GW	Sandy fine to medium GRAVEL with some silt and trace rootlets; greyish brown with orange mottles. Well graded, subangular to subrounded. Sand, fine. Sand becomes some from 0.4 m depth.				D	MD-D		
1.0			GW	Sandy fine to coarse GRAVEL; greyish brown. Well graded, subangular to subrounded. Sand, fine to coarse. Trace cobbles encountered from 1.6 m depth.				M	MD-D		
1.5											
2.0				Depth of Excavation: 2 m Termination Condition: Target depth							

Scala Penetrometer: Blows per 100mm — 2 4 6 8 10 12 >>

Test pit met target depth
Scala Penetrometer met practical refusal.
Standing groundwater was not encountered.

TS = TOPSOIL
Noticeable sand increase from 0.7 m depth.

LOG OF TEST PIT TP14

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 26/11/2019
Max Test Pit Depth : 2 m
Digger Type/Size : 24 Tonne
Bucket Type/Size : Bucket Excavator
Shear Vane No : N/A
Logged By : KF
Reviewed By : JW
Latitude : -43.628684
Longitude : 172.374642

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0	TS		ML	SILT with some sand, trace gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].					F-St		
	ALLUVIUM		GW	Fine to medium GRAVEL with some sand and silt; brownish grey. Well graded, subangular to subrounded. Sand, fine to medium.				D	MD-D		
0.5			GW	Sandy fine to coarse GRAVEL with trace cobbles; grey. Well graded, subangular to subrounded. Sand, fine to coarse.							
1.0				Cobbles become minor from 1.1 m depth.				M	MD-D		
1.5											
2.0				Depth of Excavation: 2 m Termination Condition: Target depth							

Scala Penetrometer: Blows per 100mm — 2 4 6 8 10 12

Test pit met target depth
Scala Penetrometer met practical refusal.
Standing groundwater was not encountered.

TS = TOPSOIL

LOG OF TEST PIT TP15

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 26/11/2019
Max Test Pit Depth : 2 m
Digger Type/Size : 24 Tonne
Bucket Type/Size : Bucket Excavator
Shear Vane No : N/A
Logged By : KF
Reviewed By : JW
Latitude : -43.628875
Longitude : 172.375619

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0.0	TS		ML	SILT with some sand, trace gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				D	F-St		4
0.4	ALLUVIUM			Sandy fine to medium GRAVEL with some silt and trace rootlets; brownish grey. Well graded, subangular to subrounded. Sand, fine to medium. Trace silt and sand becomes some from 0.4 m depth. Trace rootlets observed from 0.6 m depth.				M	MD-D		10
1.4			GW	Fine to coarse GRAVEL with some sand and trace cobbles; grey. Well graded, subangular to subrounded.				W	MD-D		>>
2.0				Depth of Excavation: 2 m Termination Condition: Target depth							

Test pit met target depth
Scala Penetrometer met practical refusal.
Standing groundwater was not encountered.

TS = TOPSOIL
Loosely packed gravel encountered from 1.4 to 2.0 m depth.

LOG OF TEST PIT TP16

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 26/11/2019
Max Test Pit Depth : 2 m
Digger Type/Size : 24 Tonne
Bucket Type/Size : Bucket Excavator
Shear Vane No : N/A
Logged By : KF
Reviewed By : JW
Latitude : -43.628098
Longitude : 172.375881

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0	TS		ML	SILT with some sand, trace gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				D	F-St		
0.5	ALLUVIUM		GW	Sandy fine to medium GRAVEL with some silt and trace rootlets; greyish brown. Well graded, subangular to subrounded. Sand, fine.				M	MD-D		
				Silt becomes trace from 0.6 m depth.							
				Gravel becomes fine to coarse from 0.8 m depth.							
1.0				Trace cobbles encountered from 1.0 m depth.							
				Cobbles become minor from 1.4 m depth.							
1.5											
2.0				Depth of Excavation: 2 m Termination Condition: Target depth							

Scala Penetrometer: Blows per 100mm — 2 4 6 8 10 12; >>

Test pit met target depth
Scala Penetrometer met practical refusal.
Standing groundwater was not encountered.

TS = TOPSOIL

LOG OF TEST PIT TP17

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 26/11/2019
Max Test Pit Depth : 2 m
Digger Type/Size : 24 Tonne
Bucket Type/Size : Bucket Excavator

Shear Vane No : N/A
Logged By : KF
Reviewed By : JW
Latitude : -43.628312
Longitude : 172.376954

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0	TS		ML	SILT with some sand, trace gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].					F-St		
	ALLUVIUM		GW	Fine to medium GRAVEL with some sand, silt and trace rootlets; brownish grey. Well graded, subangular to subrounded. Sand, fine.				D	MD-D		
0.5			GW	Sandy fine to coarse GRAVEL with trace rootlets; grey. Well graded, subangular to subrounded. Sand, fine to coarse.							
				Sand becomes some from 0.8 m depth.							
				No rootlets observed from 0.9 m depth.							
1.0				Trace cobbles encountered from 1.1 m depth.				M	MD-D		
1.5				Cobbles become minor from 1.6 m depth.							
2.0				Depth of Excavation: 2 m Termination Condition: Target depth							

Scala Penetrometer: Blows per 100mm — 2 4 6 8 10 12 (>>)

Test pit met target depth
Scala Penetrometer met practical refusal.
Standing groundwater was not encountered.

TS = TOPSOIL

LOG OF TEST PIT TP18

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 26/11/2019
Max Test Pit Depth : 2 m
Digger Type/Size : 24 Tonne
Bucket Type/Size : Bucket Excavator

Shear Vane No : N/A
Logged By : KF
Reviewed By : JW
Latitude : -43.627512
Longitude : 172.377228

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0.0	TS		ML	SILT with some sand, trace gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].					F-St		
	ALLUVIUM		GW	Fine to medium GRAVEL with some sand, silt and trace rootlets; brownish grey. Well graded, subangular to subrounded. Sand, fine.					MD-D		
0.5				Sandy fine to coarse GRAVEL with trace rootlets; grey. Well graded, subangular to subrounded. Sand, fine to coarse. Sand becomes trace from 0.6 to 0.7 m depth. Trace cobbles encountered from 0.8 m depth.				D			
1.0			GW						MD-D		
1.5								M			
				Sand becomes trace from 1.8 m depth.							
2.0				Depth of Excavation: 2 m Termination Condition: Target depth							

Test pit met target depth
Scala Penetrometer met practical refusal.
Standing groundwater was not encountered.

TS = TOPSOIL

LOG OF TEST PIT TP19

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 26/11/2019
Max Test Pit Depth : 2 m
Digger Type/Size : 24 Tonne
Bucket Type/Size : Bucket Excavator

Shear Vane No : N/A
Logged By : KF
Reviewed By : JW
Latitude : -43.627741
Longitude : 172.378285

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0.0	TS		ML	SILT with some sand, trace gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].					F-St		
	ALLUVIUM			Sandy fine to medium GRAVEL with some silt and trace rootlets; greyish brown. Well graded, subangular to subrounded. Sand, fine to medium.				D			
0.5				No rootlets or silt observed from 0.6 m depth.							
				Gravel and sand become fine to coarse from 0.8 m depth.							
1.0			GW	Sand becomes some and trace cobbles encountered from 1.0 m depth.					MD-D		
								M			
1.5				Sand becomes trace from 1.7 m depth.							
2.0				Depth of Excavation: 2 m Termination Condition: Target depth							

Test pit met target depth
Scala Penetrometer met practical refusal.
Standing groundwater was not encountered.

TS = TOPSOIL
Loosely packed gravel encountered from 1.7 to 2.0 m depth.

LOG OF TEST PIT TP20

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 26/11/2019
Max Test Pit Depth : 1.8 m
Digger Type/Size : 24 Tonne
Bucket Type/Size : Bucket Excavator
Shear Vane No : N/A
Logged By : KF
Reviewed By : JW
Latitude : -43.627003
Longitude : 172.378526

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0	TS		ML	SILT with some sand, trace gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				D	S-F		2 4 6 8 10 12
0.4	ALLUVIUM		GW	Fine to medium GRAVEL with some sand, silt and trace rootlets; greyish brown. Well graded, subangular to subrounded. No silt encountered from 0.4 m depth.					MD-D		>>
1.0			GW	Sandy fine to coarse GRAVEL with trace cobbles; grey. Well graded, subangular to subrounded. Sand, fine to coarse.				M	MD-D		
1.8				Depth of Excavation: 1.8 m Termination Condition: Target depth							
2.0											

Test pit met target depth
Scala Penetrometer met practical refusal.
Standing groundwater was not encountered.

TS = TOPSOIL

LOG OF TEST PIT TP21

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 26/11/2019
Max Test Pit Depth : 1.9 m
Digger Type/Size : 24 Tonne
Bucket Type/Size : Bucket Excavator

Shear Vane No : N/A
Logged By : KF
Reviewed By : JW
Latitude : -43.629026
Longitude : 172.37652

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0	TS		ML	SILT with some sand, trace gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].					F-St		
0.5	ALLUVIUM		GW	Fine to medium GRAVEL with some sand, silt and trace rootlets; greyish brown. Well graded, subangular to subrounded. No silt encountered from 0.4 m depth.				D	MD-D		
1.0			GW	Sandy fine to coarse GRAVEL; grey. Well graded, subangular to subrounded. Sand, fine to coarse. Trace cobbles encountered from 1.0 m depth. Sand becomes some from 1.3 m depth.				M	MD-D		
1.5											
2.0				Depth of Excavation: 1.9 m Termination Condition: Target depth							

Scala Penetrometer: Blows per 100mm — 2 4 6 8 10 12 (>>)

Test pit met target depth
Scala Penetrometer met practical refusal.
Standing groundwater was not encountered.

TS = TOPSOIL

GEOTECH TEST PIT LOG 2019.11.27 - TEST PIT LOGS.GPJ NZ MASTER DATA TEMPLATE.GDT 4/12/19

LOG OF TEST PIT TP22

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 26/11/2019
Max Test Pit Depth : 1.9 m
Digger Type/Size : 24 Tonne
Bucket Type/Size : Bucket Excavator
Shear Vane No : N/A
Logged By : KF
Reviewed By : JW
Latitude : -43.62955
Longitude : 172.375318

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0	TS		ML	SILT with some sand, trace gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].					F-St		
	ALLUVIUM		ML	Sandy SILT with trace rootlets; light greyish brown. Low plasticity. Sand, fine to medium.				D	F-St		
0.5			GW	Fine to medium GRAVEL with some sand and silt; brownish grey. Well graded, subangular to subrounded. Sand, fine to medium. No silt encountered from 0.6 m depth. Gravel and sand become fine to coarse from 0.8 m depth. Sand becomes trace from 1.1 to 1.3 m depth. Trace cobbles encountered from 1.4 m depth.				M	MD-D		
1.0											
1.5											
2.0				Depth of Excavation: 1.9 m Termination Condition: Target depth							

Scala Penetrometer: Blows per 100mm — 2 4 6 8 10 12

Test pit met target depth
Scala Penetrometer met practical refusal.
Standing groundwater was not encountered.

TS = TOPSOIL

LOG OF TEST PIT TP23

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 26/11/2019
Max Test Pit Depth : 1.9 m
Digger Type/Size : 24 Tonne
Bucket Type/Size : Bucket Excavator
Shear Vane No : N/A
Logged By : KF
Reviewed By : JW
Latitude : -43.630024
Longitude : 172.377367

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
0.0	TS		ML	SILT with some sand, trace gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].					F-St		
	ALLUVIUM			Fine to coarse GRAVEL with some sand, silt and trace rootlets; greyish brown. Well graded, subangular to subrounded. Sand, fine to medium.							
0.5				No silt encountered from 0.5 m depth.				D			
				Trace cobbles encountered from 0.6 m depth.							
1.0			GW	No rootlets observed from 1.0 m depth.					MD-D		
				Cobbles become minor from 1.3 m depth.							
1.5								M			
1.9				Depth of Excavation: 1.9 m Termination Condition: Target depth							
2.0											

Test pit met target depth
Scala Penetrometer met practical refusal.
Standing groundwater was not encountered.

TS = TOPSOIL

LOG OF TEST PIT TP24

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 26/11/2019
Max Test Pit Depth : 2 m
Digger Type/Size : 24 Tonne
Bucket Type/Size : Bucket Excavator

Shear Vane No : N/A
Logged By : KF
Reviewed By : JW
Latitude : -43.629807
Longitude : 172.376332

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0	TS		ML	SILT with some sand, trace gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].					F-St		
			ML	Sandy SILT with trace gravel and rootlets; greyish brown. Low plasticity. Sand, fine.					St-H		
0.5	ALLUVIUM		GW	Fine to medium GRAVEL with some sand and silt; brownish grey. Well graded, subangular to subrounded. Sand, fine to medium.				D	MD-D		
			GW	Sandy fine to coarse GRAVEL with trace cobbles; grey. Well graded, subangular to subrounded. Sand, fine to coarse.					MD-D		
1.0				Becomes moist from 1.0 m depth.							
				Sand becomes trace from 1.2 to 1.4 m depth.							
1.5								M			
				Sand becomes trace from 1.8 to 2.0 m depth.							
2.0				Depth of Excavation: 2 m Termination Condition: Target depth							

Scala Penetrometer: Blows per 100mm — 2 4 6 8 10 12 (>>)

Test pit met target depth
Scala Penetrometer met practical refusal.
Standing groundwater was not encountered.

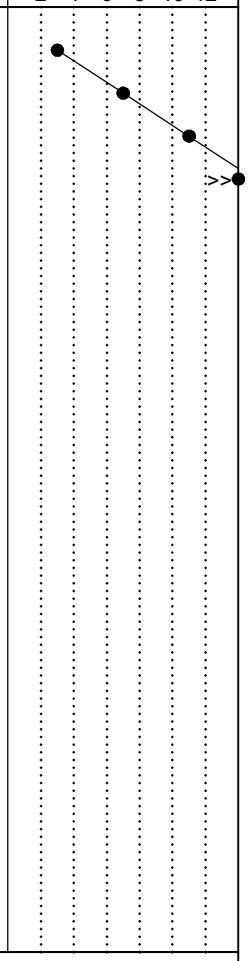
TS = TOPSOIL

LOG OF TEST PIT TP25

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 26/11/2019
Max Test Pit Depth : 2 m
Digger Type/Size : 24 Tonne
Bucket Type/Size : Bucket Excavator
Shear Vane No : N/A
Logged By : KF
Reviewed By : JW
Latitude : -43.630517
Longitude : 172.376123

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0.0	TS		ML	SILT with some sand, trace gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].					F-St		
0.3	ALLUVIUM		GW	Fine to medium GRAVEL with some sand, silt and trace rootlets; greyish brown. Well graded, subangular to subrounded. Sand, fine. No silt observed from 0.4 m depth.				D	MD-D		
0.6			GW	Sandy fine to coarse GRAVEL with some sand, silt and trace rootlets; greyish brown. Well graded, subangular to subrounded. Sand, fine. Trace cobbles encountered from 0.9 m depth. Cobbles become minor from 1.4 m depth.				M	MD-D		
2.0				Depth of Excavation: 2 m Termination Condition: Target depth							



Test pit met target depth
Scala Penetrometer met practical refusal.
Standing groundwater was not encountered.

TS = TOPSOIL

LOG OF TEST PIT TP26

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 27/11/2019
Max Test Pit Depth : 2 m
Digger Type/Size : 24 Tonne
Bucket Type/Size : Bucket Excavator
Shear Vane No : N/A
Logged By : KF
Reviewed By : JW
Latitude : -43.630801
Longitude : 172.377121

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0.0	TS		ML	SILT with some sand, trace gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].					St-VSt		
	ALLUVIUM		GW	Fine to medium GRAVEL with some sand, silt and trace rootlets; greyish brown. Well graded, subangular to subrounded. Sand, fine to medium. No rootlets observed from 0.4 m depth.				D	MD-D		
0.5											
1.0			GW	Fine to coarse GRAVEL with some sand and trace rootlets; grey. Well graded, subangular to subrounded. Sand, fine to coarse.							
1.5				Trace cobbles encountered from 1.4 m depth.				M	MD-D		
2.0				Depth of Excavation: 2 m Termination Condition: Target depth							

Scala Penetrometer: Blows per 100mm — 2 4 6 8 10 12 (>>)

Test pit met target depth
Scala Penetrometer met practical refusal.
Standing groundwater was not encountered.

TS = TOPSOIL

LOG OF TEST PIT TP27

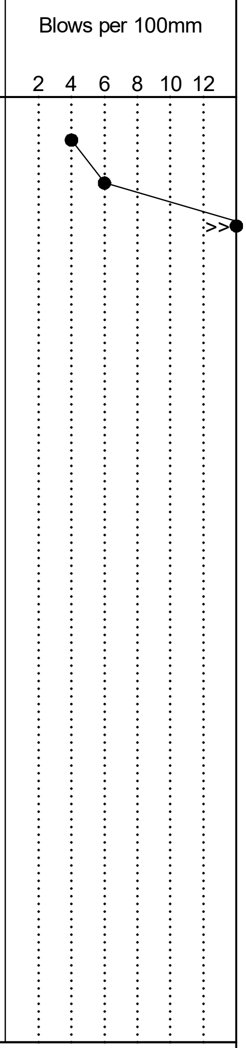
ENGEO

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 27/11/2019
Max Test Pit Depth : 2 m
Digger Type/Size : 24 Tonne
Bucket Type/Size : Bucket Excavator
Shear Vane No : N/A
Logged By : KF
Reviewed By : JW
Latitude : -43.631612
Longitude : 172.376997

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier – Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)
0.0–0.2	TS		ML	SILT with some sand, trace gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				D	F-St	
0.2–0.4	ALLUVIUM		GW	Fine to medium GRAVEL with some sand, silt and trace rootlets; greyish brown. Well graded, subangular to subrounded. Sand, fine to medium.				D	MD-D	
0.4–2.0 (0.5, 1.0, 1.5, 2.0)	ALLUVIUM		GW	Fine to coarse GRAVEL with some sand, trace cobbles and rootlets; grey. Well graded, subangular to subrounded. Sand, fine to coarse. Cobbles become minor from 1.4 m depth.				M	MD-D	
				Depth of Excavation: 2 m Termination Condition: Target depth						

Scala Penetrometer



Test pit met target depth
Scala Penetrometer met practical refusal.
Standing groundwater was not encountered.

TS = TOPSOIL

LOG OF TEST PIT TP28

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 27/11/2019
Max Test Pit Depth : 2 m
Digger Type/Size : 24 Tonne
Bucket Type/Size : Bucket Excavator
Shear Vane No : N/A
Logged By : KF
Reviewed By : JW
Latitude : -43.632226
Longitude : 172.377512

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0	TS		ML	SILT with some sand, trace gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].					St-VSt		
	ALLUVIUM		GW	Fine to medium GRAVEL with some sand, silt and trace rootlets; greyish brown. Well graded, subangular to subrounded. Sand, fine.					MD-D		
0.5			GW	Fine to coarse GRAVEL with some sand; grey. Well graded, subangular to subrounded. Sand, fine to coarse. Trace cobbles encountered from 0.7 m depth.				D	L-MD		
1.0											
1.5				Trace rootlets observed from 1.4 to 1.6 m depth. Becomes brownish grey from 1.7 m depth.				M			
2.0				Depth of Excavation: 2 m Termination Condition: Target depth							

Test pit met target depth
Scala Penetrometer met practical refusal.
Standing groundwater was not encountered.

TS = TOPSOIL
Loosely packed gravel encountered from 0.5 to 1.0 m depth.

GEOTECH TEST PIT LOG 2019.11.27 - TEST PIT LOGS.GPJ NZ MASTER DATA TEMPLATE.GDT 4/12/19

LOG OF TEST PIT TP29

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 27/11/2019
Max Test Pit Depth : 2 m
Digger Type/Size : 24 Tonne
Bucket Type/Size : Bucket Excavator
Shear Vane No : N/A
Logged By : KF
Reviewed By : JW
Latitude : -43.632008
Longitude : 172.378017

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0	TS		ML	SILT with some sand, trace gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].					F-St		
	ALLUVIUM		GW	Fine to medium GRAVEL with some sand and silt; greyish brown. Well graded, subangular to subrounded. Sand, fine.					MD-D		
0.5			GW	Fine to coarse GRAVEL with some sand and trace cobbles; brownish grey. Well graded, subangular to subrounded. Sand, fine to coarse.				D	MD-D		
1.0			GW	Sandy fine to coarse GRAVEL with trace cobbles; grey. Well graded, subangular to subrounded. Sand, fine to coarse.				M	MD-D		
1.5				Becomes wet from 1.8 m depth.							
				Cobbles become minor from 1.9 m depth.				W			
2.0				Depth of Excavation: 2 m Termination Condition: Target depth							

Scala Penetrometer: Blows per 100mm — 2 4 6 8 10 12 (>>)

Test pit met target depth
Scala Penetrometer met practical refusal.
Standing groundwater was not encountered.

TS = TOPSOIL

LOG OF TEST PIT TP30

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 27/11/2019
Max Test Pit Depth : 2 m
Digger Type/Size : 24 Tonne
Bucket Type/Size : Bucket Excavator

Shear Vane No : N/A
Logged By : KF
Reviewed By : JW
Latitude : -43.631103
Longitude : 172.378188

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0.0	TS		ML	SILT with some sand, trace gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].					F-St		
	ALLUVIUM		GW	Fine to medium GRAVEL with some sand, silt and trace rootlets; greyish brown. Well graded, subangular to subrounded. Sand, fine.					MD-D		
0.5			GW	Fine to coarse GRAVEL with some sand and trace cobbles; brownish grey. Well graded, subangular to subrounded. Sand, fine to coarse.				D	MD-D		
1.0			GW	Sandy fine to coarse GRAVEL with trace cobbles; grey. Well graded, subangular to subrounded. Sand, fine to coarse.							
1.5				Trace cobbles encountered from 1.4 m depth.				M	MD-D		
2.0				Depth of Excavation: 2 m Termination Condition: Target depth							

Scala Penetrometer: Blows per 100mm — 2 4 6 8 10 12 (>>)

Test pit met target depth
Scala Penetrometer met practical refusal.
Standing groundwater was not encountered.

TS = TOPSOIL

LOG OF TEST PIT TP31

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 27/11/2019
Max Test Pit Depth : 1.9 m
Digger Type/Size : 24 Tonne
Bucket Type/Size : Bucket Excavator
Shear Vane No : N/A
Logged By : KF
Reviewed By : JW
Latitude : -43.628972
Longitude : 172.378419

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
0.0	TS		ML	SILT with some sand, trace gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].					St-VSt		
	ALLUVIUM		GW	Fine to medium GRAVEL with some sand, silt and trace rootlets; brownish grey. Well graded, subangular to subrounded. Sand, fine to coarse.				D	MD-D		
0.5				Becomes moist from 0.6 m depth.							
			GW	Sandy fine to coarse GRAVEL with trace cobbles; grey. Well graded,subangular to subrounded. Sand, fine to coarse.				M	MD-D		
1.0											
1.5				Gravel becomes fine to medium from 1.4 to 1.6 m depth.							
2.0				Depth of Excavation: 1.9 m Termination Condition: Target depth							

Test pit met target depth
Scala Penetrometer met practical refusal.
Standing groundwater was not encountered.

TS = TOPSOIL

LOG OF TEST PIT TP32

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 27/11/2019
Max Test Pit Depth : 2 m
Digger Type/Size : 24 Tonne
Bucket Type/Size : Bucket Excavator
Shear Vane No : N/A
Logged By : KF
Reviewed By : JW
Latitude : -43.630257
Longitude : 172.378612

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
0.0	TS		ML	SILT with some sand, trace gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].					St-VSt		
0.5	ALLUVIUM		GW	Fine to medium GRAVEL with some sand, silt and trace rootlets; greyish brown. Well graded, subangular to subrounded. Sand, fine to medium.				D	MD-D		
				Gravel and sand become fine to coarse from 0.6 m depth. No silt encountered from 0.7 m depth.							
1.0											
1.5				Cobbles become minor from 1.5 m depth.				M			
				Sand becomes trace from 1.8 m depth.							
2.0				Depth of Excavation: 2 m Termination Condition: Target depth							

Test pit met target depth
Scala Penetrometer met practical refusal.
Standing groundwater was not encountered.

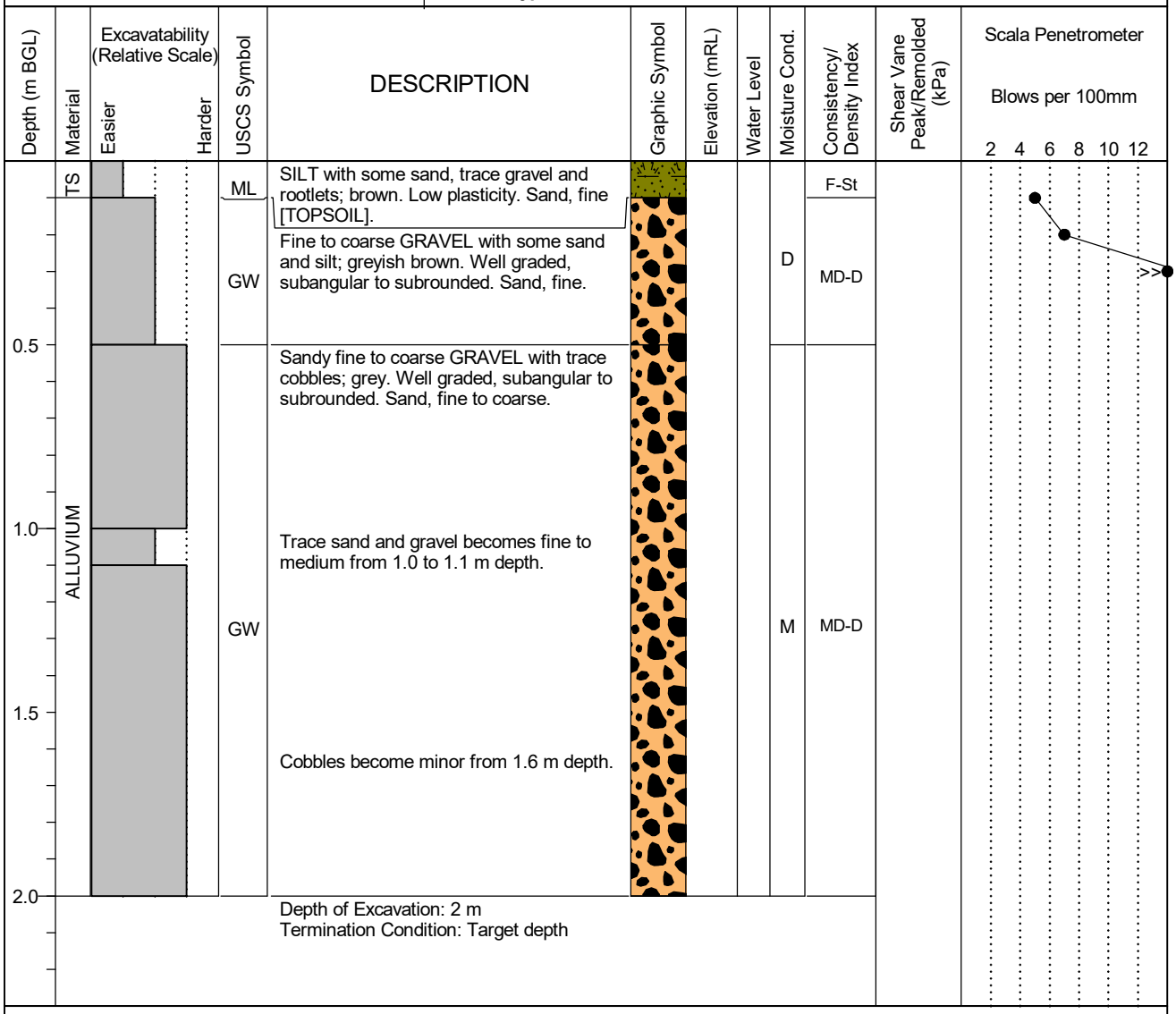
TS = TOPSOIL

LOG OF TEST PIT TP33

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 05/12/2019
Max Test Pit Depth : 2 m
Digger Type/Size : 24 Tonne
Bucket Type/Size : Bucket Excavator

Shear Vane No : N/A
Logged By : KF/CR
Reviewed By : JW
Latitude : -43.625244
Longitude : 172.377003



Test pit met target depth.
Scala Penetrometer met target depth
Standing groundwater was not encountered.

TS = TOPSOIL
Partial sidewall collapse observed from 0.8 to 1.2 m depth.

LOG OF TEST PIT TP34

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 05/12/2019
Max Test Pit Depth : 2 m
Digger Type/Size : 24 Tonne
Bucket Type/Size : Bucket Excavator
Shear Vane No : N/A
Logged By : KF/CR
Reviewed By : JW
Latitude : -43.62571
Longitude : 172.37585

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
0.0	TS		ML	SILT with some sand, trace gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].					St-VSt		
	ALLUVIUM			Fine to coarse GRAVEL with some sand, silt and trace cobbles; greyish brown. Well graded, subangular to subrounded. Sand, fine.				D			
0.5			GW						MD-D		
1.0											
1.5				Sandy fine to coarse GRAVEL with trace cobbles; grey. Well graded, subangular to subrounded. Sand, fine to coarse.				M			
			GW						MD-D		
2.0				Depth of Excavation: 2 m Termination Condition: Target depth							

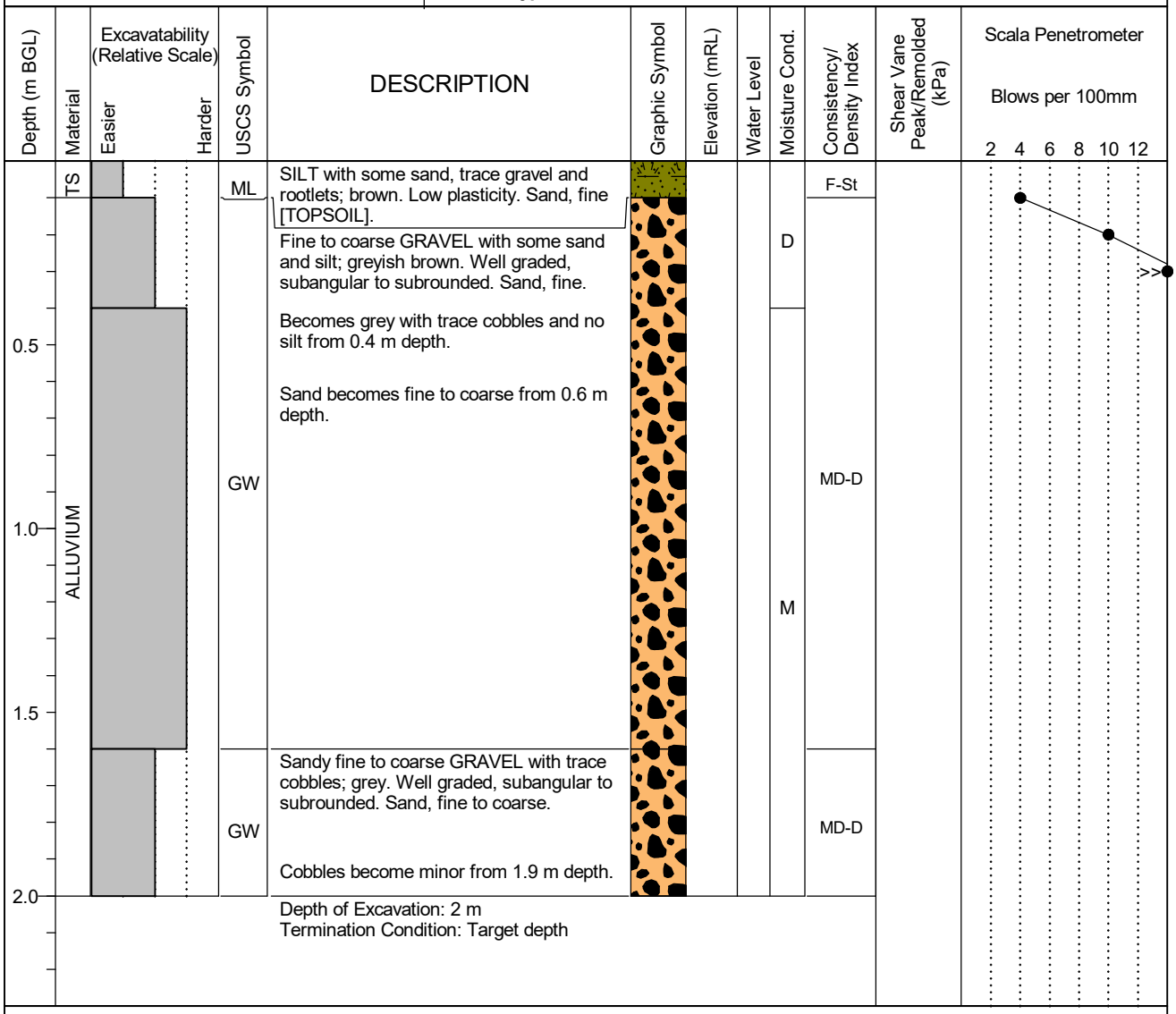
Test pit met target depth.
Scala Penetrometer met target depth
Standing groundwater was not encountered.

TS = TOPSOIL

LOG OF TEST PIT TP35

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 05/12/2019
Max Test Pit Depth : 2 m
Digger Type/Size : 24 Tonne
Bucket Type/Size : Bucket Excavator
Shear Vane No : N/A
Logged By : KF/CR
Reviewed By : JW
Latitude : -43.626261
Longitude : 172.374476



Test pit met target depth.
Scala Penetrometer met target depth
Standing groundwater was not encountered.

TS = TOPSOIL

GEOTECH TEST PIT LOG 2019.12.XX - REMAINING TP LOGS.GPJ NZ MASTER DATA TEMPLATE.GDT 9/12/19

LOG OF TEST PIT TP36

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 05/12/2019
Max Test Pit Depth : 2 m
Digger Type/Size : 24 Tonne
Bucket Type/Size : Bucket Excavator
Shear Vane No : N/A
Logged By : KF/CR
Reviewed By : JW
Latitude : -43.62611
Longitude : 172.373398

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0	TS		ML	SILT with some sand, trace gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].					St-VSt		
0.5	ALLUVIUM		GW	Sandy fine to coarse GRAVEL with some silt; greyish brown. Well graded, subangular to subrounded. Sand, fine.				D	MD-D		
			SW	Fine to coarse SAND with trace gravel; grey. Well graded.					MD-D		
1.0			GW	Sandy fine to coarse GRAVEL with trace cobbles; grey. Well graded, subangular to subrounded. Sand, fine to coarse.				M	MD-D		
1.5											
2.0				Depth of Excavation: 2 m Termination Condition: Target depth							

Scala Penetrometer: Blows per 100mm — 2 4 6 8 10 12 (>>)

Test pit met target depth.
Scala Penetrometer met target depth
Standing groundwater was not encountered.

TS = TOPSOIL

LOG OF TEST PIT TP37

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 05/12/2019
Max Test Pit Depth : 2 m
Digger Type/Size : 24 Tonne
Bucket Type/Size : Bucket Excavator
Shear Vane No : N/A
Logged By : KF/CR
Reviewed By : JW
Latitude : -43.625636
Longitude : 172.37306

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
	TS		ML	SILT with some sand, trace gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].					F-St		
	ALLUVIUM		GW	Fine to coarse GRAVEL with some sand, silt and trace rootlets; greyish brown. Well graded, subangular to subrounded. Sand, fine.				D	MD-D		
0.5			GW	Sandy fine to coarse GRAVEL with trace cobbles; grey. Well graded, subangular to subrounded. Sand, fine to coarse.					MD-D		
1.0			GW	Fine to coarse GRAVEL with some sand and trace cobbles; grey. Well graded, subangular to subrounded. Sand, fine to coarse.				M	MD-D		
1.5				Sand becomes trace from 1.8 m depth.							
2.0				Depth of Excavation: 2 m Termination Condition: Target depth							

Test pit met target depth.
Scala Penetrometer met target depth
Standing groundwater was not encountered.

TS = TOPSOIL

LOG OF TEST PIT TP38

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 05/12/2019
Max Test Pit Depth : 2 m
Digger Type/Size : 24 Tonne
Bucket Type/Size : Bucket Excavator
Shear Vane No : N/A
Logged By : KF/CR
Reviewed By : JW
Latitude : -43.625349
Longitude : 172.373725

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
0	TS		ML	SILT with some sand, trace gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].					St-VSt		
	ALLUVIUM		GW	Fine to coarse GRAVEL with some sand, silt and trace rootlets; greyish brown. Well graded, subangular to subrounded. Sand, fine.				D	MD-D		
0.5				Sandy fine to coarse GRAVEL with trace cobbles; grey. Well graded, subangular to subrounded. Sand, fine to coarse.							
1.0				Sand becomes trace from 0.9 to 1.2 m depth.							
			GW					M	MD-D		
1.5				Cobbles become minor from 1.4 m depth.							
				No rootlets encountered from 1.6 m depth.							
2.0				Depth of Excavation: 2 m Termination Condition: Target depth							

Test pit met target depth.
Scala Penetrometer met target depth
Standing groundwater was not encountered.

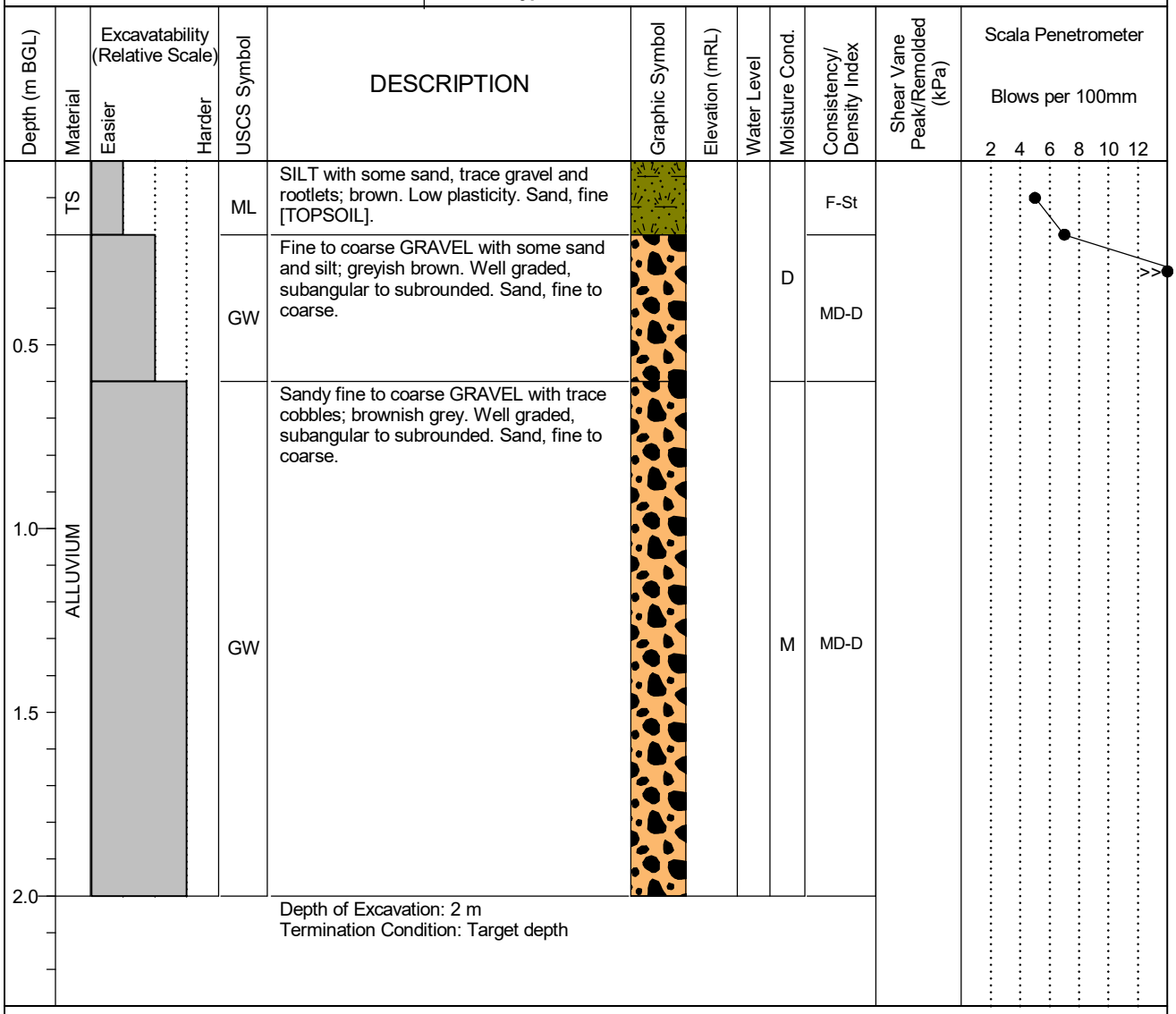
TS = TOPSOIL

LOG OF TEST PIT TP39

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 05/12/2019
Max Test Pit Depth : 2 m
Digger Type/Size : 24 Tonne
Bucket Type/Size : Bucket Excavator

Shear Vane No : N/A
Logged By : KF/CR
Reviewed By : JW
Latitude : -43.625512
Longitude : 172.374782



Test pit met target depth.
Scala Penetrometer met target depth
Standing groundwater was not encountered.

TS = TOPSOIL

LOG OF TEST PIT TP40

ENGEO

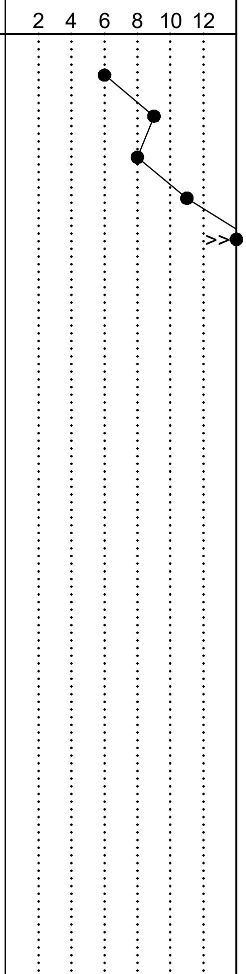
Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client	: Hughes Developments Ltd	**Shear Vane No**	: N/A
Date	: 05/12/2019	**Logged By**	: KF/CR
Max Test Pit Depth	: 2 m	**Reviewed By**	: JW
Digger Type/Size	: 24 Tonne	**Latitude**	: -43.62479
Bucket Type/Size	: Bucket Excavator	**Longitude**	: 172.375034

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier – Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)
0.0	TS		ML	SILT with some sand and trace rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				D	F-St	
	ALLUVIUM		ML	SILT with some sand, trace gravel and rootlets; brown. Low plasticity. Sand, fine. Gravel becomes minor from 0.3 m depth.				D	St-VSt	
0.5	ALLUVIUM		GW	Fine to coarse GRAVEL with some sand, silt and trace rootlets; brownish grey. Well graded, subangular to subrounded. Sand, fine to coarse.				D	MD-D	
1.0 / 1.5	ALLUVIUM		GW	Sandy fine to coarse GRAVEL with trace cobbles and rootlets; grey. Well graded, subangular to subrounded. Sand, fine to coarse. Cobbles become minor from 1.6 m depth.				M	MD-D	
2.0				Depth of Excavation: 2 m Termination Condition: Target depth						

Scala Penetrometer

Blows per 100mm



Test pit met target depth.
Scala Penetrometer met target depth
Standing groundwater was not encountered.

TS = TOPSOIL

LOG OF TEST PIT TP41

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 05/12/2019
Max Test Pit Depth : 2 m
Digger Type/Size : 24 Tonne
Bucket Type/Size : Bucket Excavator
Shear Vane No : N/A
Logged By : KF/CR
Reviewed By : JW
Latitude : -43.624988
Longitude : 172.376043

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
	TS		ML	SILT with some sand and trace rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].					F-St		
0.5	ALLUVIUM		GW	Fine to coarse GRAVEL with some sand; grey. Well graded, subangular to subrounded. Sand, fine to coarse.				D	MD-D		>>
1.0			GW	Sandy fine to coarse GRAVEL with trace cobbles; brownish grey. Well graded, subangular to subrounded. Sand, fine to coarse. Becomes moist from 1.0 m depth.				M			
2.0				Depth of Excavation: 2 m Termination Condition: Target depth							

Test pit met target depth.
Scala Penetrometer met target depth
Standing groundwater was not encountered.

TS = TOPSOIL

LOG OF TEST PIT TP42

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 05/12/2019
Max Test Pit Depth : 2 m
Digger Type/Size : 24 Tonne
Bucket Type/Size : Bucket Excavator

Shear Vane No : N/A
Logged By : KF/CR
Reviewed By : JW
Latitude : -43.624293
Longitude : 172.376247

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier – Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0.0	TS		ML	SILT with some sand and trace rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].					F-St		
	ALLUVIUM		GW	Fine to coarse GRAVEL with some sand, silt and trace rootlets; greyish brown. Well graded, subangular to subrounded. Sand, fine.				D	MD-D		
0.5				Sandy fine to coarse GRAVEL with trace cobbles and rootlets; grey. Well graded, subangular to subrounded. Sand, fine to coarse.							
				Sand becomes trace from 0.7 m depth.							
1.0			GW					M	MD-D		
1.5				Cobbles become minor from 1.4 m depth.							
				No rootlets encountered from 1.6 m depth.							
2.0				Depth of Excavation: 2 m Termination Condition: Target depth							

Test pit met target depth.
Scala Penetrometer met target depth
Standing groundwater was not encountered.

TS = TOPSOIL
Partial sidewall collapse observed from 0.4 m depth.
Noticeable sand decrease from 0.7 m depth.

LOG OF TEST PIT TP43

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 05/12/2019
Max Test Pit Depth : 2 m
Digger Type/Size : 24 Tonne
Bucket Type/Size : Bucket Excavator
Shear Vane No : N/A
Logged By : KF/CR
Reviewed By : JW
Latitude : -43.628731
Longitude : 172.377389

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
0	TS		ML	SILT with some sand and trace rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].					F-St		
0.5	ALLUVIUM		GW	Fine to coarse GRAVEL with some sand; grey. Well graded, subangular to subrounded. Sand, fine to coarse.				D	MD-D		
1.0			GW	Sandy fine to coarse GRAVEL with trace cobbles; brownish grey. Well graded, subangular to subrounded. Sand, fine to coarse.				M	MD-D		
1.5				Sand becomes trace from 1.6 to 1.8 m depth.							
2.0				Depth of Excavation: 2 m Termination Condition: Target depth							

Test pit met target depth.
Scala Penetrometer met target depth
Standing groundwater was not encountered.

TS = TOPSOIL

LOG OF TEST PIT TP44

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 05/12/2019
Max Test Pit Depth : 2 m
Digger Type/Size : 24 Tonne
Bucket Type/Size : Bucket Excavator

Shear Vane No : N/A
Logged By : KF/CR
Reviewed By : JW
Latitude : -43.628451
Longitude : 172.378087

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier – Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
0.0	TOPSOIL		ML	SILT with some sand and trace rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].					F-St		>>
0.5	ALLUVIUM		GW	Fine to coarse GRAVEL with some sand; grey. Well graded, subangular to subrounded. Sand, fine to coarse.				D	MD-D		
1.0			GW	Sandy fine to coarse GRAVEL with trace cobbles; grey. Well graded, subangular to subrounded. Sand, fine to coarse.				M	MD-D		
1.5											
2.0				Depth of Excavation: 2 m Termination Condition: Target depth							

Test pit met target depth.
Scala Penetrometer met target depth
Standing groundwater was not encountered.

LOG OF TEST PIT TP45

Geotechnical Investigation
92 Dunns Crossing Road
Rolleston
12903

Client : Hughes Developments Ltd
Date : 05/12/2019
Max Test Pit Depth : 2.1 m
Digger Type/Size : 24 Tonne
Bucket Type/Size : Bucket Excavator
Shear Vane No : N/A
Logged By : KF/CR
Reviewed By : JW
Latitude : -43.62816
Longitude : 172.378736

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0.0	TS		ML	SILT with some sand and trace rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].					F-St		
0.5	ALLUVIUM		GW	Fine to coarse GRAVEL with some sand, silt and trace rootlets; greyish brown. Well graded, subangular to subrounded. Sand, fine.				D	MD-D		
1.0			GW	Sandy fine to coarse GRAVEL with trace cobbles and rootlets; grey. Well graded, subangular to subrounded. Sand, fine to coarse. Sand becomes trace from 1.0 to 1.1 m depth.				M	MD-D		
1.5				Sand becomes trace from 1.5 to 1.7 m depth. Cobbles become minor from 1.8 m depth.							
2.0				Depth of Excavation: 2.1 m Termination Condition: Target depth							

Scala Penetrometer: Blows per 100mm — 2 4 6 8 10 12 (>>)

Test pit met target depth.
Scala Penetrometer met target depth
Standing groundwater was not encountered.

TS = TOPSOIL
Partial sidewall collapse observed from 0.8 m depth.

APPENDIX 3:

ECan Borelogs

Bore or Well No	BX23/0895
Well Name	Selwyn Road
Owner	Mike & Tania Croucher

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

Well Number	BX23/0895	**File Number**	
Owner	Mike & Tania Croucher	**Well Status**	Active (exist, present)
Street/Road	Selwyn Road	**NZTM Grid Reference**	BX23:49887-68726
Locality	Springston	**NZTM X and Y**	1549887 - 5168726
Location Description		**Location Accuracy**	50 - 300m
CWMS Zone	Selwyn - Waihora	**Use**	Domestic and Stockwater,
Groundwater Allocation Zone	Selwyn-Waimakariri	**Water Level Monitoring**	--
Depth	53.50m	**Water Level Count**	1
Diameter	150mm	**Initial Water Level**	5.80m below MP
Measuring Point Description	Top of Casing	**Highest Water Level**	5.80m below MP
Measuring Point Elevation		**Lowest Water Level**	5.80m below MP
Elevation Accuracy		**First reading**	06 May 2019
Ground Level	0.45m below MP	**Last reading**	06 May 2019
Strata Layers	9	**Calc Min 95%**	
Aquifer Name		**Aquifer Tests**	0
Aquifer Type		**Yield Drawdown Tests**	1
Drill Date	16 Apr 2019	**Max Tested Yield**	
Driller	Clemence Drilling Contractors	**Drawdown at Max Tested Yield**	
Drilling Method	Rotary/Percussion	**Specific Capacity**	0.56 l/s/m
Casing Material	Steel	**Last Updated**	01 Oct 2019
Pump Type		**Last Field Check**	06 May 2019
Water Use Data	No		

Screens

Screen No.	Screen Type	Top (m)	Bottom (m)	Slot Size (mm)	Slot Length (mm)	Diameter (mm)	Leader Length (mm)
1	Stainless steel	51.5	53.5				

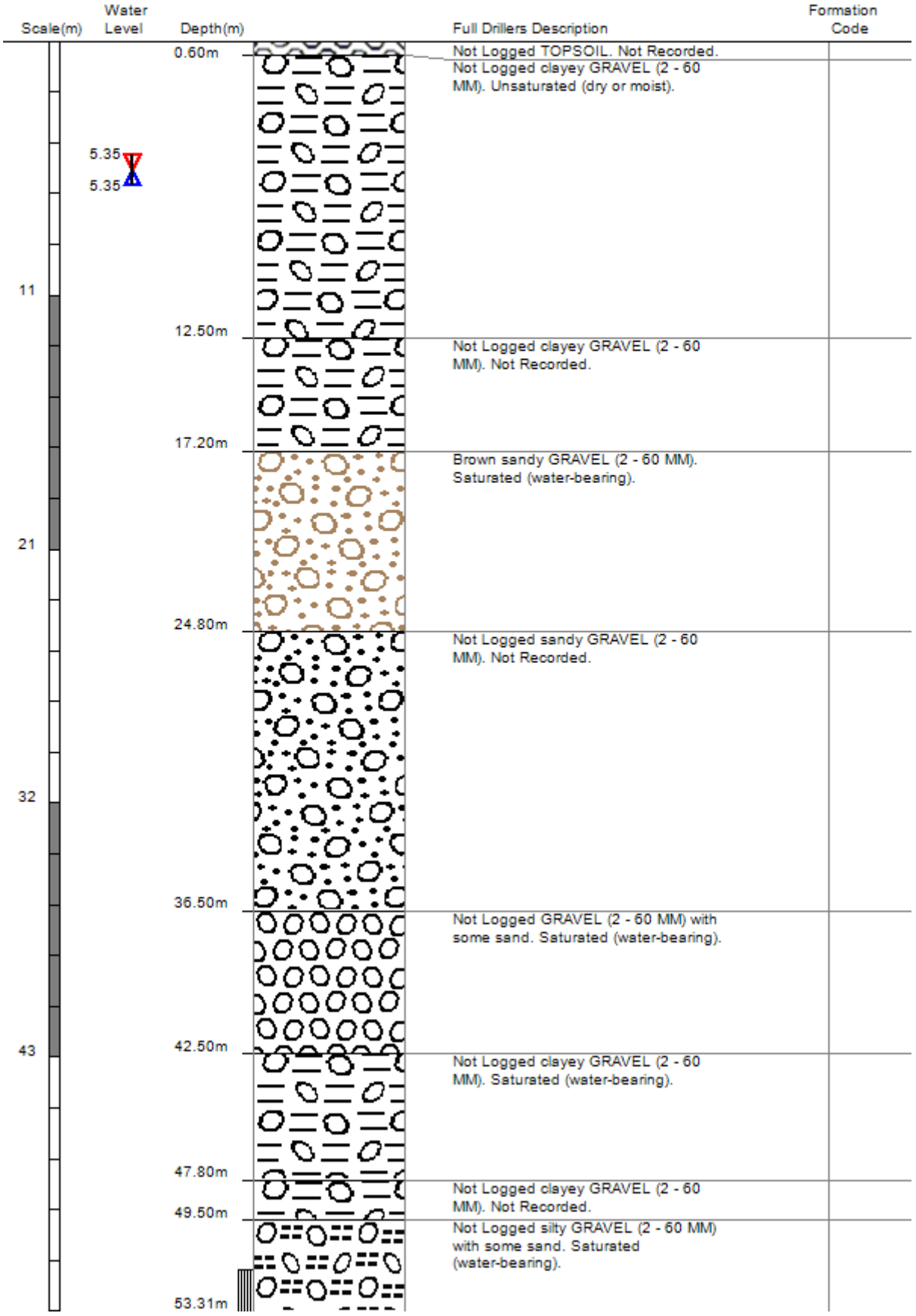
Step Tests

Step Test Date	Step	Yield	Yield GPM	DrawDown	Step Duration
06 May 2019	1	2.5	32.99546	4.5	15

Borelog for well BX23/0895

Grid Reference (NZTM): 1549888 mE, 5168727 mN
Location Accuracy: 50 - 300m
Ground Level Altitude: m +MSD Accuracy:
Driller: Clemence Drilling Contractors
Drill Method: Rotary/Percussion
Borelog Depth: 53.3 m Drill Date: 16-Apr-2019

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha



Bore or Well No	M36/4387
Well Name	DUNNS CROSSING RD
Owner	Mr & Mrs I G & D C Robertson

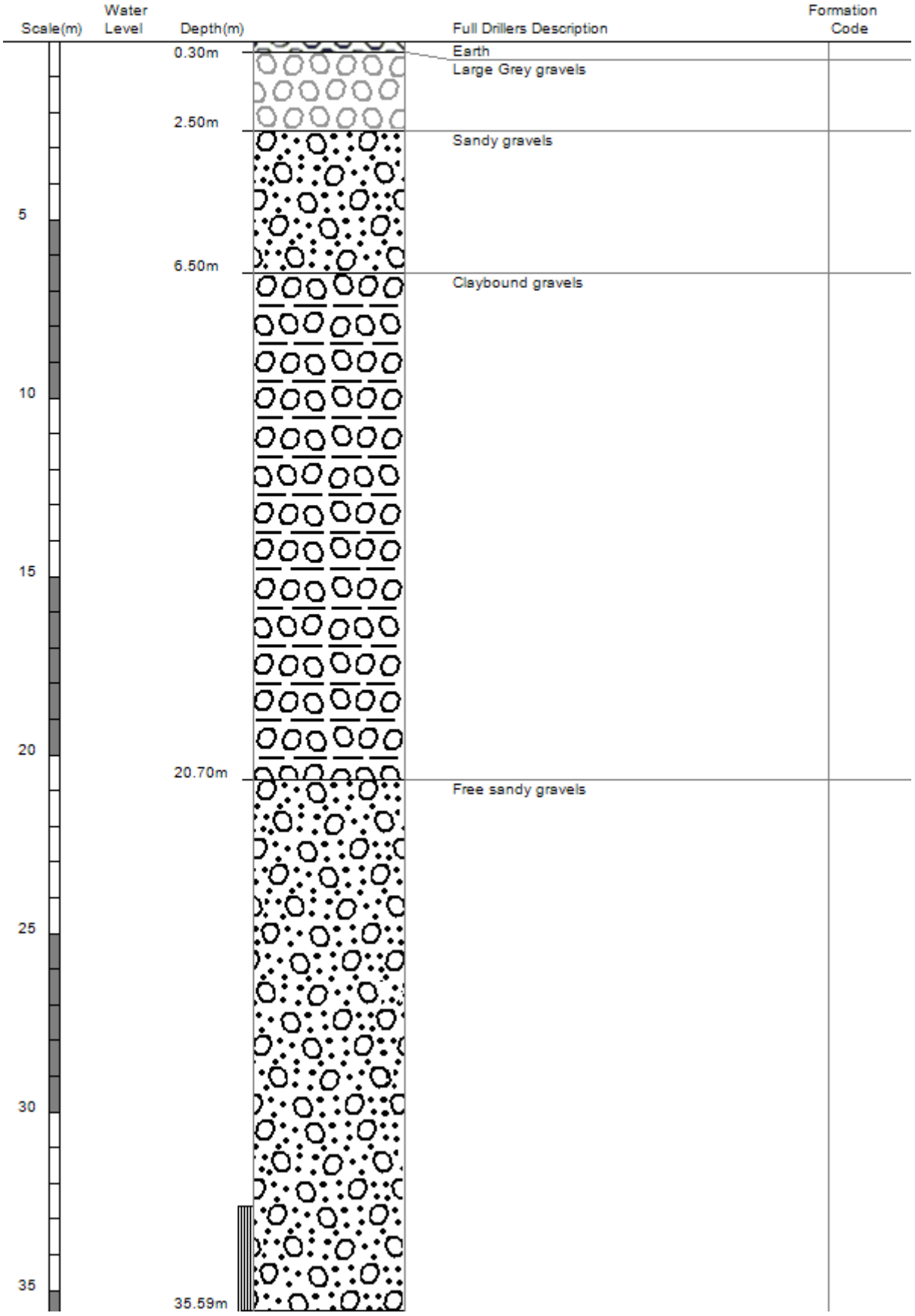
Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

Well Number	M36/4387	**File Number**	CO6C/02792
Owner	Mr & Mrs I G & D C Robertson	**Well Status**	Active (exist, present)
Street/Road	DUNNS CROSSING RD	**NZTM Grid Reference**	BX23:49703-68988
Locality	ROLLESTON	**NZTM X and Y**	1549703 - 5168988
Location Description		**Location Accuracy**	2 - 15m
CWMS Zone	Selwyn - Waihora	**Use**	Domestic Supply,
Groundwater Allocation Zone	Selwyn-Waimakariri	**Water Level Monitoring**	--
Depth	35.60m	**Water Level Count**	0
Diameter	200mm	**Initial Water Level**	5.65m below MP
Measuring Point Description		**Highest Water Level**	
Measuring Point Elevation	36.46m above MSL (Lyttelton 1937)	**Lowest Water Level**	
Elevation Accuracy	< 2.5 m	**First reading**	
Ground Level	0.00m above MP	**Last reading**	
Strata Layers	5	**Calc Min 95%**	6.50m below MP
Aquifer Name		**Aquifer Tests**	0
Aquifer Type	Unknown	**Yield Drawdown Tests**	2
Drill Date	11 Oct 1991	**Max Tested Yield**	18 l/s
Driller	McMillan Drilling Ltd	**Drawdown at Max Tested Yield**	10 m
Drilling Method	Rotary/Percussion	**Specific Capacity**	1.64 l/s/m
Casing Material	STEEL	**Last Updated**	08 Nov 2013
Pump Type	Unknown	**Last Field Check**	
Water Use Data	Yes		

Borelog for well M36/4387

Grid Reference (NZTM): 1549704 mE, 5168988 mN
Location Accuracy: 2 - 15m
Ground Level Altitude: 36.5 m +MSD Accuracy: < 2.5 m
Driller: McMillan Drilling Ltd
Drill Method: Rotary/Percussion
Borelog Depth: 35.6 m Drill Date: 11-Oct-1991

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha



Bore or Well No	M36/4449
Well Name	DUNNS CROSSING RD
Owner	TYACK GJ & FR

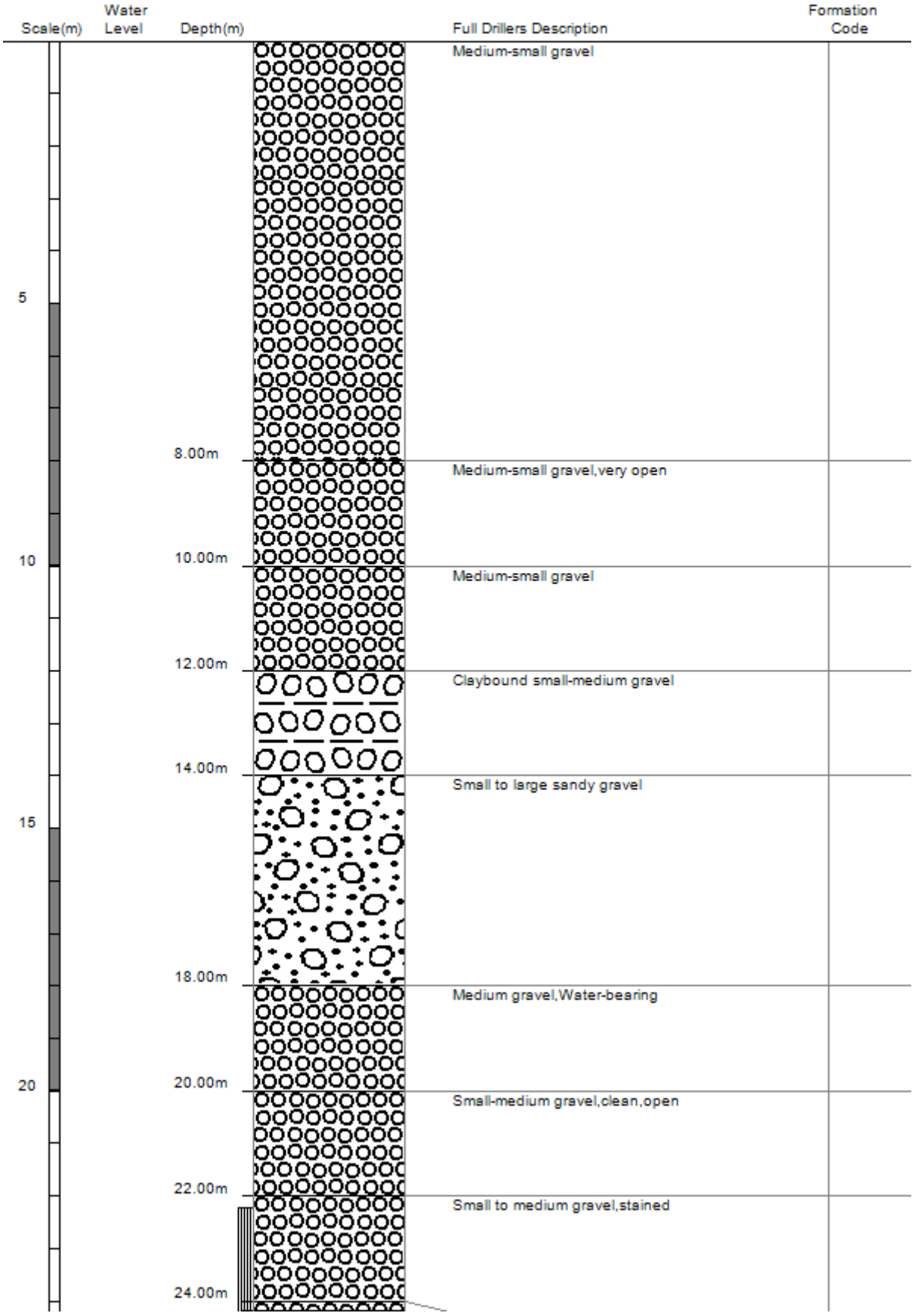
Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

Well Number	M36/4449	**File Number**	CO6C/02046
Owner	TYACK GJ & FR	**Well Status**	Not Used
Street/Road	DUNNS CROSSING RD	**NZTM Grid Reference**	BX23:49508-69470
Locality	ROLLESTON	**NZTM X and Y**	1549508 - 5169470
Location Description	LOT 1	**Location Accuracy**	50 - 300m
CWMS Zone	Selwyn - Waihora	**Use**	Irrigation,
Groundwater Allocation Zone	Selwyn-Waimakariri	**Water Level Monitoring**	--
Depth	24.20m	**Water Level Count**	0
Diameter	150mm	**Initial Water Level**	
Measuring Point Description		**Highest Water Level**	
Measuring Point Elevation	38.81m above MSL (Lyttelton 1937)	**Lowest Water Level**	
Elevation Accuracy	< 2.5 m	**First reading**	
Ground Level	0.00m above MP	**Last reading**	
Strata Layers	9	**Calc Min 95%**	7.70m below MP
Aquifer Name	Riccarton Gravel	**Aquifer Tests**	0
Aquifer Type	Unknown	**Yield Drawdown Tests**	1
Drill Date	09 Jun 1992	**Max Tested Yield**	6 l/s
Driller	Dynes Road Drilling	**Drawdown at Max Tested Yield**	5 m
Drilling Method	Cable Tool	**Specific Capacity**	1.36 l/s/m
Casing Material		**Last Updated**	08 Nov 2013
Pump Type	Unknown	**Last Field Check**	
Water Use Data	No		

Borelog for well M36/4449

Grid Reference (NZTM): 1549508 mE, 5169471 mN
Location Accuracy: 50 - 300m
Ground Level Altitude: 38.8 m +MSD Accuracy: < 2.5 m
Driller: Dynes Road Drilling
Drill Method: Cable Tool
Borelog Depth: 24.2 m Drill Date: 09-Jun-1992

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha



Bore or Well No	M36/4450
Well Name	DUNNS CROSSING RD
Owner	Mr & Mrs L K & J C Blackmore

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

Well Number	M36/4450	**File Number**	CO6C/02046
Owner	Mr & Mrs L K & J C Blackmore	**Well Status**	Active (exist, present)
Street/Road	DUNNS CROSSING RD	**NZTM Grid Reference**	BX23:49388-69660
Locality	ROLLESTON	**NZTM X and Y**	1549388 - 5169660
Location Description	DP61278 LOT 2	**Location Accuracy**	50 - 300m
CWMS Zone	Selwyn - Waihora	**Use**	Irrigation,
Groundwater Allocation Zone	Selwyn-Waimakariri	**Water Level Monitoring**	--
Depth	25.20m	**Water Level Count**	0
Diameter	150mm	**Initial Water Level**	
Measuring Point Description		**Highest Water Level**	
Measuring Point Elevation	39.62m above MSL (Lyttelton 1937)	**Lowest Water Level**	
Elevation Accuracy	< 2.5 m	**First reading**	
Ground Level	0.00m above MP	**Last reading**	
Strata Layers	8	**Calc Min 95%**	8.10m below MP
Aquifer Name	Riccarton Gravel	**Aquifer Tests**	0
Aquifer Type	Unknown	**Yield Drawdown Tests**	1
Drill Date	09 Apr 1992	**Max Tested Yield**	6 l/s
Driller	Dynes Road Drilling	**Drawdown at Max Tested Yield**	6 m
Drilling Method	Cable Tool	**Specific Capacity**	1.00 l/s/m
Casing Material		**Last Updated**	08 Nov 2013
Pump Type	Unknown	**Last Field Check**	
Water Use Data	No		

Screens

Screen No.	Screen Type	Top (m)	Bottom (m)	Slot Size (mm)	Slot Length (mm)	Diameter (mm)	Leader Length (mm)
1	Stainless steel	23.2	25.2				

Step Tests

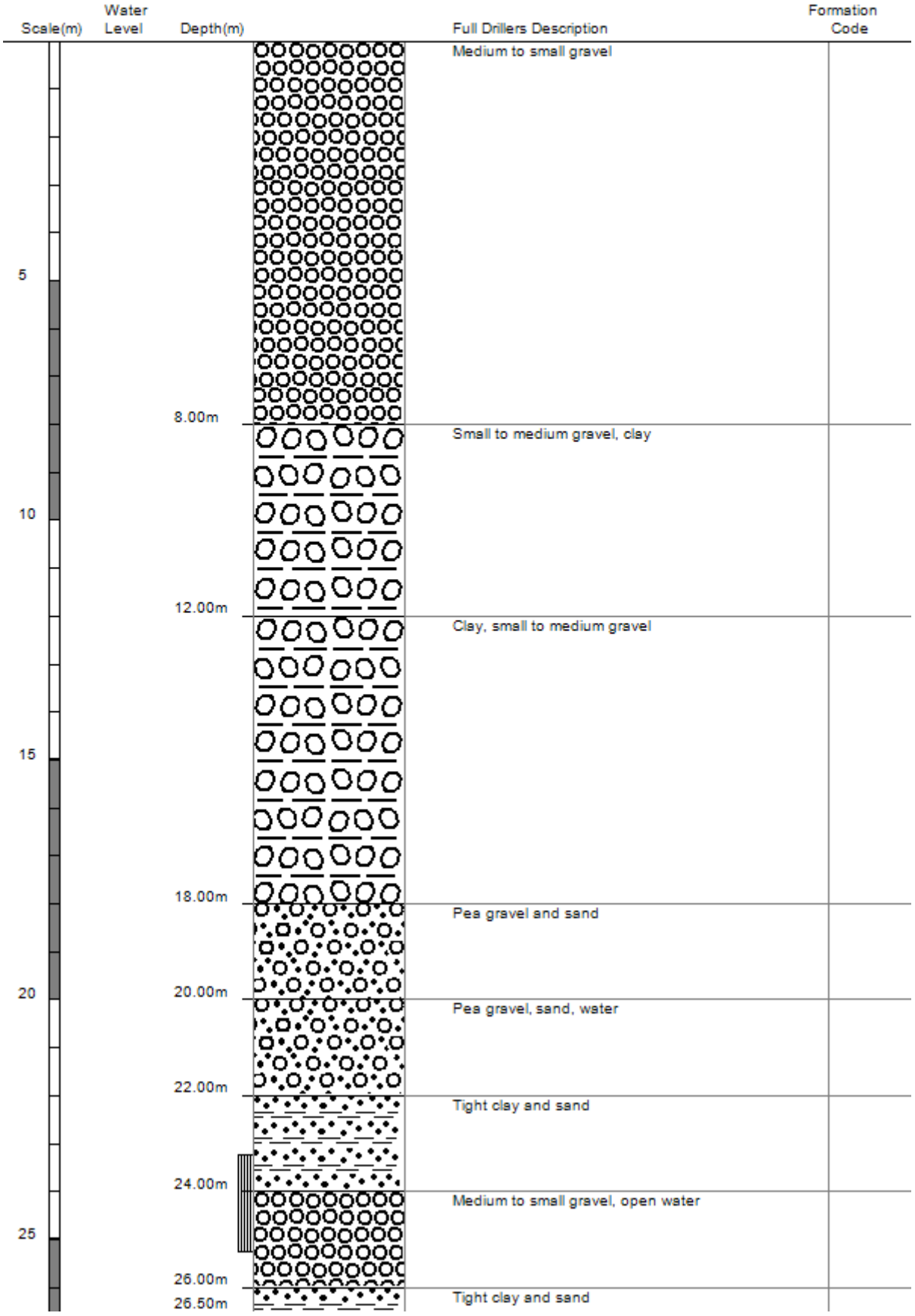
Step Test Date	Step	Yield	Yield GPM	DrawDown	Step Duration
09 Apr 1992	1	6.1	80.50892	6.1	0

No comments for this well

Borelog for well M36/4450

Grid Reference (NZTM): 1549388 mE, 5169661 mN
Location Accuracy: 50 - 300m
Ground Level Altitude: 39.6 m +MSD Accuracy: < 2.5 m
Driller: Dynes Road Drilling
Drill Method: Cable Tool
Borelog Depth: 26.5 m Drill Date: 09-Apr-1992

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha



Bore or Well No	M36/7416
Well Name	SELWYN ROAD
Owner	Kilsyth Limited

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

Well Number	M36/7416	**File Number**	CO6C/20361
Owner	Kilsyth Limited	**Well Status**	Active (exist, present)
Street/Road	SELWYN ROAD	**NZTM Grid Reference**	BX23:49058-68781
Locality	ROLLESTON	**NZTM X and Y**	1549058 - 5168781
Location Description		**Location Accuracy**	50 - 300m
CWMS Zone	Selwyn - Waihora	**Use**	Irrigation,
Groundwater Allocation Zone	Selwyn-Waimakariri	**Water Level Monitoring**	--
Depth	46.90m	**Water Level Count**	0
Diameter	200mm	**Initial Water Level**	5.50m below MP
Measuring Point Description	ToC	**Highest Water Level**	
Measuring Point Elevation	35.86m above MSL (Lyttelton 1937)	**Lowest Water Level**	
Elevation Accuracy	< 5 m	**First reading**	
Ground Level	0.32m below MP	**Last reading**	
Strata Layers	13	**Calc Min 95%**	11.10m below MP
Aquifer Name		**Aquifer Tests**	0
Aquifer Type		**Yield Drawdown Tests**	1
Drill Date	18 Aug 2003	**Max Tested Yield**	
Driller	McMillan Drilling Ltd	**Drawdown at Max Tested Yield**	
Drilling Method	Rotary/Percussion	**Specific Capacity**	3.83 l/s/m
Casing Material	STEEL	**Last Updated**	08 Nov 2013
Pump Type		**Last Field Check**	
Water Use Data	No		

Screens

Screen No.	Screen Type	Top (m)	Bottom (m)	Slot Size (mm)	Slot Length (mm)	Diameter (mm)	Leader Length (mm)
1	Stainless steel	44.9	46.9				

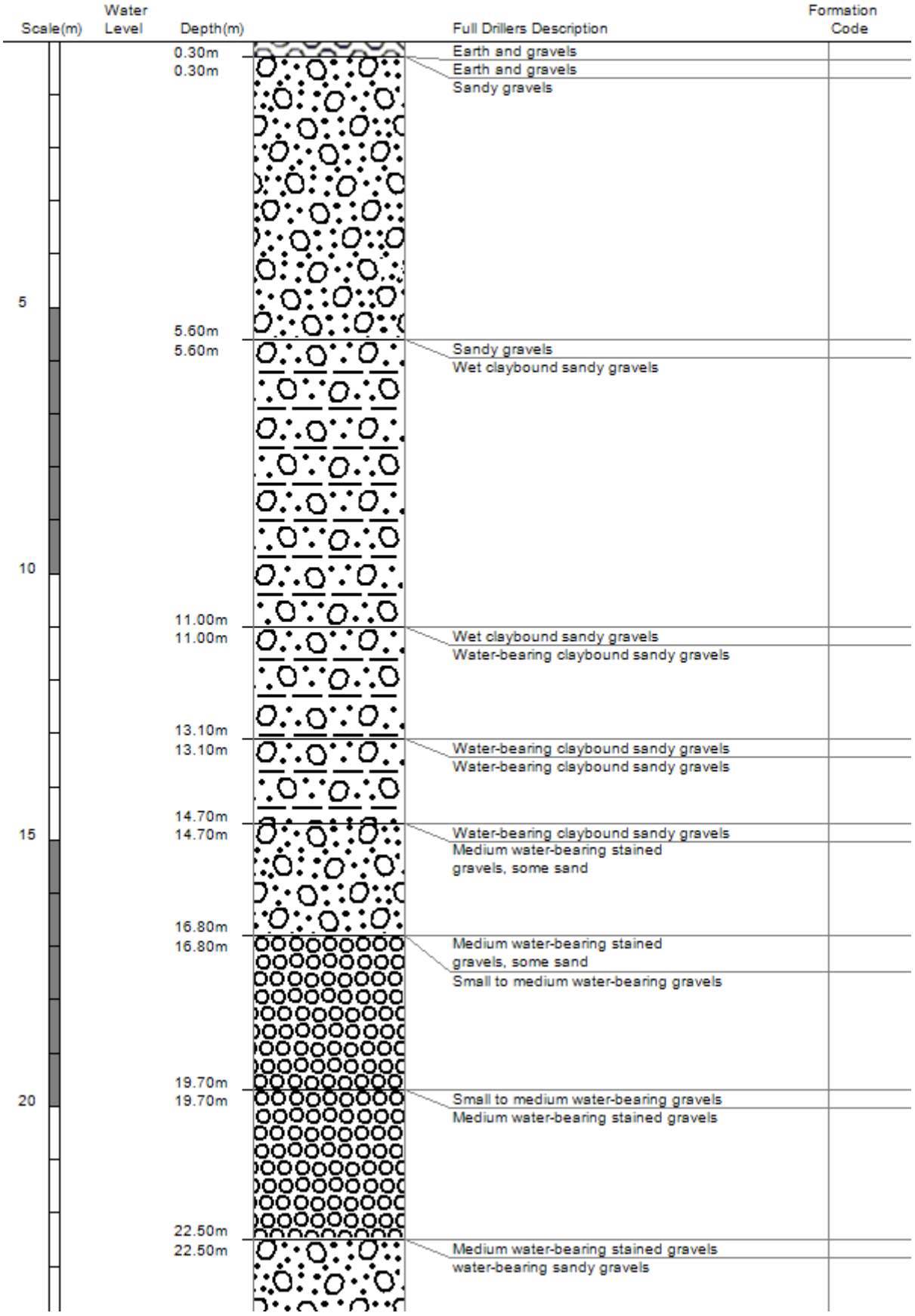
Step Tests

Step Test Date	Step	Yield	Yield GPM	DrawDown	Step Duration
18 Aug 2003	1	15.91128	209.999985	4.15	3

Borelog for well M36/7416

Grid Reference (NZTM): 1549058 mE, 5168781 mN
Location Accuracy: 50 - 300m
Ground Level Altitude: 35.5 m +MSD Accuracy: < 0.5 m
Driller: McMillan Drilling Ltd
Drill Method: Rotary/Percussion
Borelog Depth: 47.7 m Drill Date: 18-Aug-2003

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha



Bore or Well No	M36/20535
Well Name	870 Goulds Road
Owner	Mr S & Mrs M Baxter

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

Well Number	M36/20535	**File Number**	CO6C/31914
Owner	Mr S & Mrs M Baxter	**Well Status**	Active (exist, present)
Street/Road	870 Goulds Road	**NZTM Grid Reference**	BX23:50017-69231
Locality	Rolleston	**NZTM X and Y**	1550017 - 5169231
Location Description		**Location Accuracy**	10 - 50m
CWMS Zone	Selwyn - Waihora	**Use**	Domestic and Stockwater,
Groundwater Allocation Zone	Selwyn-Waimakariri	**Water Level Monitoring**	--
Depth	30.00m	**Water Level Count**	0
Diameter	150mm	**Initial Water Level**	7.10m below MP
Measuring Point Description		**Highest Water Level**	
Measuring Point Elevation	35.00m above MSL (Lyttelton 1937)	**Lowest Water Level**	
Elevation Accuracy	< 5 m	**First reading**	
Ground Level	0.00m above MP	**Last reading**	
Strata Layers	4	**Calc Min 95%**	
Aquifer Name		**Aquifer Tests**	0
Aquifer Type		**Yield Drawdown Tests**	0
Drill Date	04 Feb 2011	**Max Tested Yield**	
Driller	Daly Water Wells Ltd	**Drawdown at Max Tested Yield**	
Drilling Method	Rotary Rig	**Specific Capacity**	
Casing Material	STEEL	**Last Updated**	07 Dec 2011
Pump Type		**Last Field Check**	
Water Use Data	No		

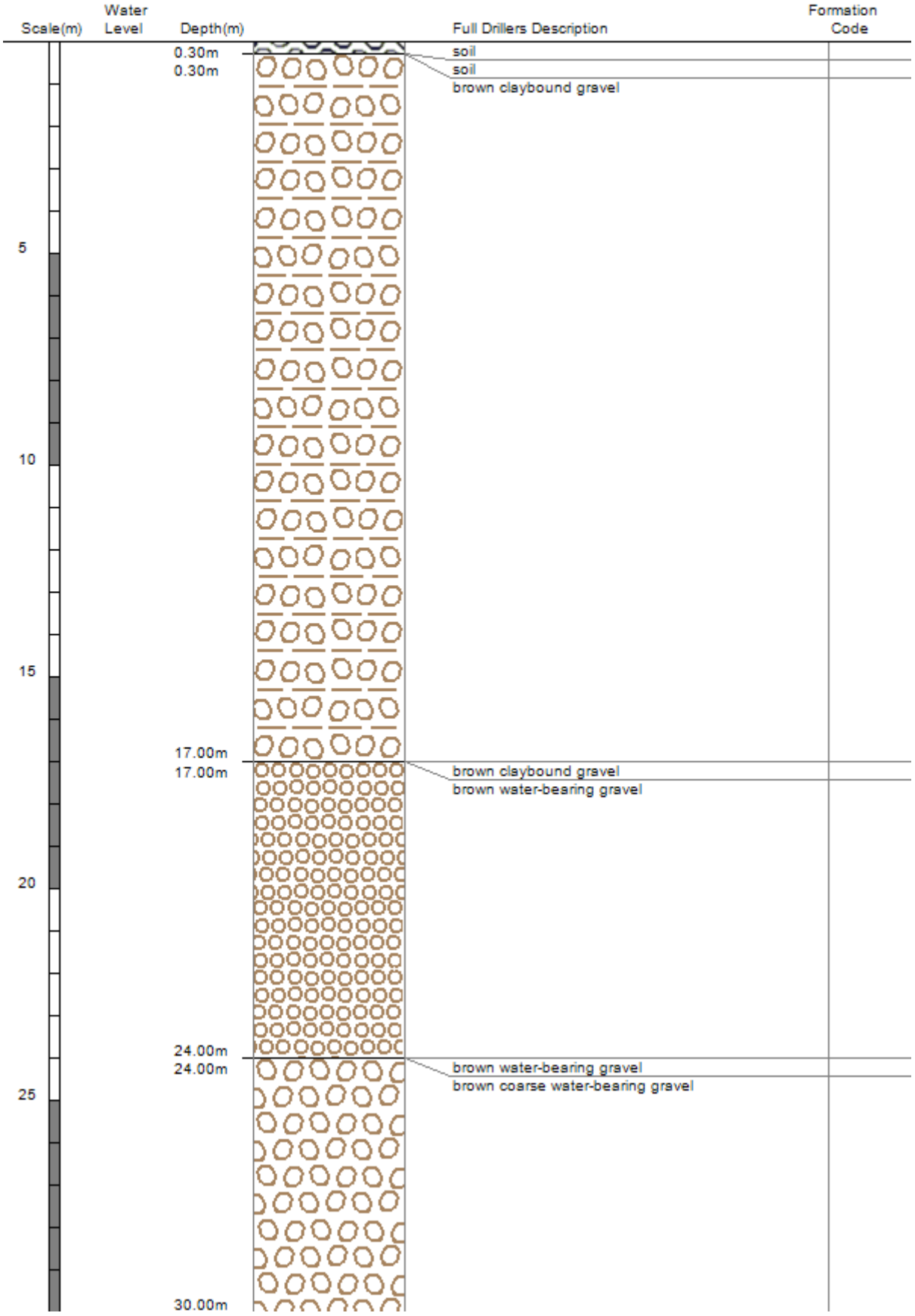
No screen data for this well

No step tests for this well

Borelog for well M36/20535

Grid Reference (NZTM): 1550018 mE, 5169231 mN
Location Accuracy: 10 - 50m
Ground Level Altitude: 35.0 m +MSD Accuracy: < 0.5 m
Driller: Daly Water Wells Ltd
Drill Method: Rotary Rig
Borelog Depth: 30.0 m Drill Date: 04-Feb-2011

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha



ENGEO

Expect Excellence

Geotechnical Investigation

597 East Maddisons Road

Rolleston

Christchurch

Submitted to:

Hughes Developments Ltd

Christchurch

ENGEO Limited

124 Montreal Street, Sydenham, Christchurch 8023

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03.09.2020

12903.000.005_97

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ENGEO Document Control:

Report Title	Geotechnical Investigation - 597 East Maddisons Road, Rolleston			
Project No.	12903.000.005	Doc ID	97	
Client	Hughes Developments Ltd	Client Contact	Kelvin Back	
Distribution (PDF)	Kelvin Back			
Date	Revision Details/Status	WP	Author	Reviewer
03/09/2020	Issued to Client	BK	JRW	DEB

1 Introduction

ENGEO Ltd was requested by Hughes Developments Ltd to undertake a geotechnical investigation of the property at 597 East Maddisons Road, Rolleston, Christchurch, as outlined in our variation proposal (ref: P2020.001.804_01).

The purpose of this assessment is to develop a conceptual geological model of the site, assess the likely future land performance, comment on the suitability of the site for residential subdivision, address the requirements of Section 106 of the Resource Management Act (RMA), and provide recommendations for subdivision works and foundations for typical timber framed residential dwellings.

Our scope of works includes the following:

- Complete a desktop study of relevant available geotechnical and geological publications, including the NZ Geotechnical and Environment Canterbury Databases.
- Undertake a geotechnical site walkover.
- Undertake 29 hand auger boreholes with associated Scala penetrometer tests to assess the near surface material types and strength characteristics.
- Organise and observe the excavation of 26 test pits, including geotechnical logging of the exposed soils.
- Preparation of this report outlining our findings on the ground conditions and comment on the suitability of the site for residential subdivision, including the provision of the likely foundation Technical Category, conceptual foundation recommendations for typical timber framed residential dwellings, and discuss likely geohazards as required by Section 106 of the RMA.

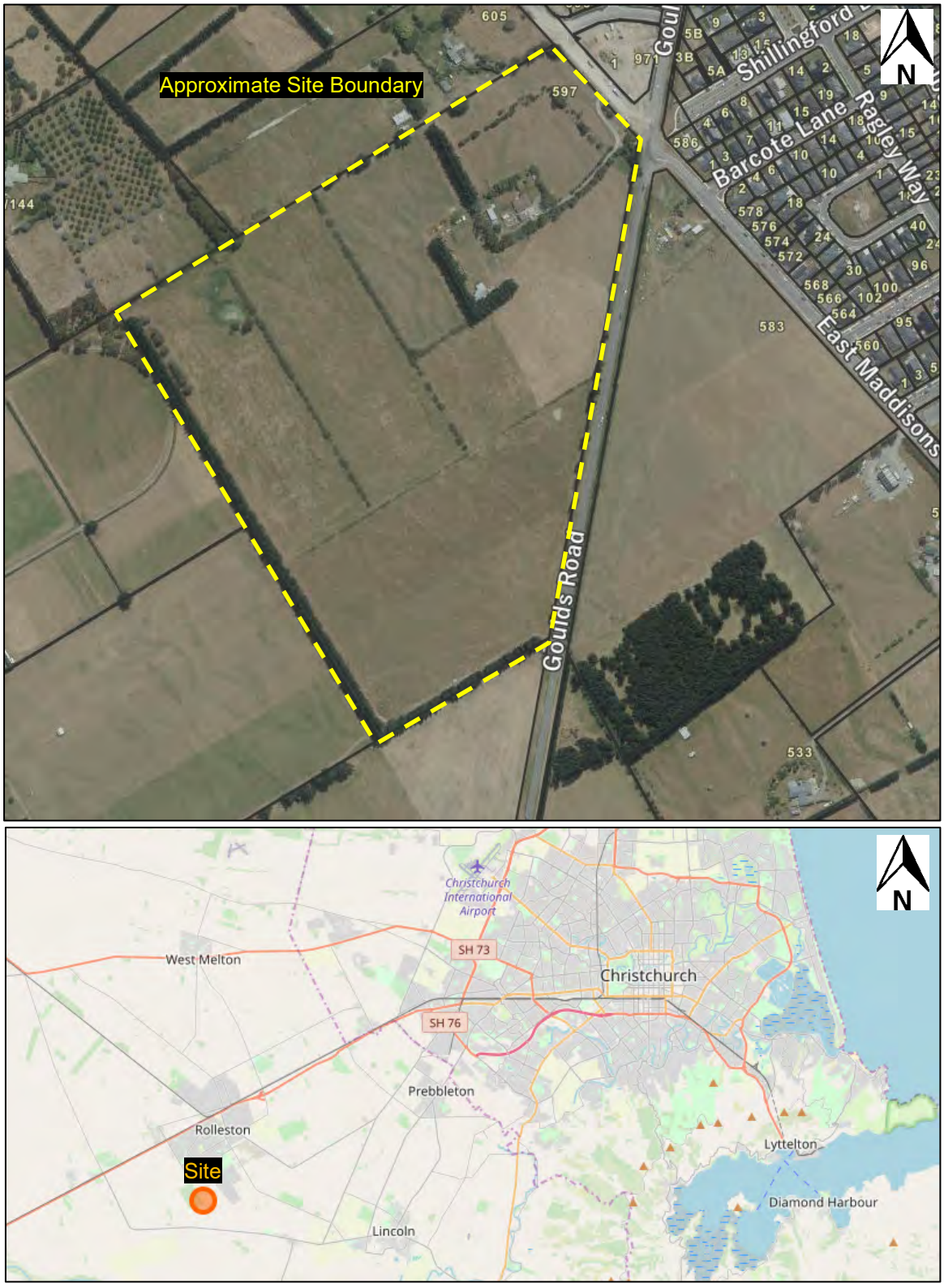
2 Site Description

The site comprises of one property with a total area of four hectares and the following legal description (Canterbury Maps):

- LOT 1 DP 57004 BLK III

The site is located approximately 3 km south of Rolleston town centre and is bound on all sides by rural properties (Figure 1).

Figure 1: Site Location Plan



Images sourced from Canterbury Maps and "© OpenStreetMap contributors". Not to scale.

3 Geological Model

3.1 Regional Geology

The site has been regionally mapped by GNS (Forsyth et al., 2008) as being underlain by brownish grey river alluvium (Q2a).

3.2 Geomorphology

The site comprises relatively flat ground, with gentle undulations and depressions in some areas. As evident on aerial imagery (Canterbury Maps, 2019) and observed during our site walkover conducted on 25 August 2020, undulating and depressed ground can be attributed to paleo-channels, which traverse the site in a general northwest to southeast direction (Figure 2). Based on observations, sandy silt deposits with variable thickness are expected to have in-filled the paleo-channels where they have not remained as channel features. Inferred paleo-channels have been mapped to give an indication of areas with potential channel in-fill (Appendix 1).

Figure 2: Historical Aerial Photo – 1970 - 1974

Image sourced from Canterbury Maps. Not to scale.

3.3 Geohazards

3.3.1 Seismicity

There are no known or mapped faults in the immediate area of the site, however the site may be at risk of ground shaking induced by movement of proximal or distal faults.

The site is located between two recently discovered fault systems, the Greendale Fault and the Port Hills Fault, the ruptures of which initiated the ongoing Canterbury Earthquake Sequence (CES). The Greendale Fault has been mapped approximately 6 km north / northwest of the site and trends roughly east-west with a surface rupture length of approximately 28 km (GNS, 2015), while the Port Hills Fault remains unmapped as the fault did not rupture at the surface. Movement on the Port Hills Fault is believed to have extended to within 1 km to 2 km below ground surface.

Large regional areas of faulting (GNS, 2015) namely the Ashley Fault, Porters Pass - Amberley Fault Zone, and the Hope and Alpine Faults, are further afield but present a high seismic hazard to the Christchurch area due to the anticipated size of earthquakes generated. The largest of these faults is the Alpine Fault, which has a return period of 250 - 300 years and is expected to produce a M8 earthquake. The last rupture on the Alpine Fault is believed to have occurred in 1717 (Pettinga et al., 2001).

3.3.2 Liquefaction and Lateral Spreading

The site is located in an area mapped where “damaging liquefaction is unlikely” (NZGD Map CGD5140, 2012), and a “zone of very low liquefaction potential” (GNS, 2006).

3.4 Site Investigation

Site investigations to assess the shallow subsurface material types and strength characteristics were undertaken by ENGEO on 27 and 28 August 2020. Twenty-six test pits and 29 hand auger investigations with associated Scala penetrometer tests were completed to a maximum depth of 2.2 m below ground level.

The investigations revealed subsurface conditions across the site are consistent with the published geological mapping, as summarised in Table 1. Hand auger and test pit logs are attached as Appendix 2.

Table 1: Summary of Subsurface Investigations

Soil Type	Depth to Top of Layer (m)	General Layer Thickness (m)	Density / Consistency	Additional Comments
TOPSOIL	0.0	0.1 – 0.3	Stiff to Very Stiff	-
Sandy GRAVEL	0.3	Unknown	Medium Dense to Very Dense	Tightly packed and consistent across the site

3.5 ECan Boreholes

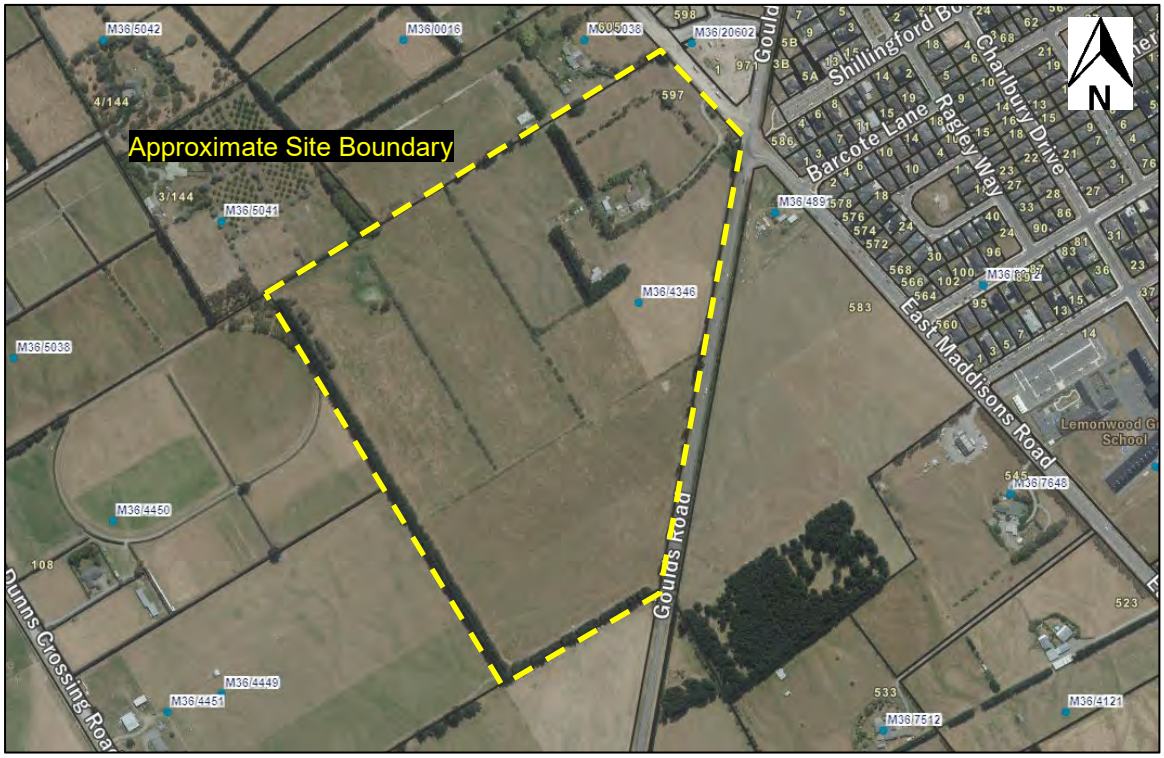
A review of five, deep ECan borehole logs was conducted. The first (M36/4346), is located on-site, and appear to be water wells providing the properties irrigation and domestic supply. The other boreholes are located to the east (M36/4891), north (M36/5041), south (M36/4449) and west (M36/7512) of the site.

Well logs from the five holes of interest are attached as Appendix 3 and summarised in Table 2.

Table 2: Generalised Summary of ECan Boreholes

ECan Borehole	Total Depth (m)	Water Level Below Ground Level (m)	Generalised Borelog as Logged by Driller
M36/4346	28.5	9.71	Gravel with silt and sand to 28.5 m depth. A layer of silt recorded from 6 to 8 m depth.
M36/4891	26.7	9.81	Gravel to 26.7 m depth.
M36/5041	34	9.73	Gravel with silt and sand to 34 m depth.
M36/4449	24.2	9.27	Gravel to 24.2 m depth.
M36/7512	29	9.32	Sandy gravel to 21.3 m depth.

Figure 3: Nearby ECan Borehole Locations



Aerial photograph sourced from Canterbury Maps. Not to scale.

3.6 Groundwater

Groundwater is recorded in the surrounding ECan boreholes at approximately 9 to 10 m depth.

3.7 Site Seismic Class

In accordance with NZS 1170.5:2004, Class D applies to this particular site, defining it as a 'deep soft soil site'.

4 Liquefaction Analysis

Owing to the nature of the subsurface materials and depth to groundwater at the site, we consider the potential for liquefaction and lateral spreading on the site to be very low.

We therefore consider future land performance to be in line with Technical Category 1 (TC1), whereby future land damage from liquefaction is unlikely, and ground settlements are expected to be within normally accepted tolerances.

5 RMA Section 106 Requirements and Suitability to Subdivide

Section 106 of the Resource Management Act 1991 states a consent authority may refuse to grant a subdivision consent, or may grant a consent subject to specific consent conditions if it considers that:

- There is a significant risk from natural hazards; or
- Sufficient provision has not been made for legal or physical access to each allotment to be created by the subdivision.

An assessment of the risk from natural hazards as required by the RMA includes the following:

- The likelihood of natural hazards occurring (whether individually or in combination);
- The material damage to land in respect of which the consent is sought, other land, or structures that would result from natural hazards; and
- Any likely subsequent use of the land in respect of which the consent is sought that would accelerate, worsen, or result in material damage of the kind referred to in paragraph (b).

We have assessed the risk of natural hazards at the site in accordance with Section 106 of the Resource Management Act (RMA) and considered the risk to the site from rockfall, inundation (debris), slope stability, subsidence, flooding and tsunami. Based on our observations and the nature of the site, its performance during the CES, and the site's distance from the nearest significant watercourse, we consider it is unlikely for the site to be subject to natural hazards such as rockfall, inundation (debris), slope stability, subsidence, flooding and tsunami. As such, the site is considered suitable for subdivision from a geotechnical perspective.

6 Geotechnical Recommendations

6.1 Earthworks

Earthworks carried out for the subdivision shall be in accordance with NZS 4404:2010, Land Development and Subdivision Infrastructure and NZS 4431:1989, Code of Practice for Earth filling for Residential Development. In particular, any areas to receive fill should be stripped of all vegetation, topsoil, non-engineered fill, soft or organic soils prior to fill placement.

Fill may comprise clean native (site won) sandy gravel or silty soils, or clean imported soils and / or granular fill, compacted to achieve no less than 95% of maximum dry density. Fill faces steeper than 1V:1H and higher than 600 mm should be retained and referred back to ENGEO. Although unlikely, where any springs or groundwater seeps are encountered, they should be intercepted with suitable drainage and discharged to a Council approved outlet.

All unretained batters of pond and stormwater drains constructed with the native sandy gravel material should be at an inclination no steeper than 1V:3H, with protection schemes in place to control erosion of the formed batters within the waterways.

A comprehensive earthworks specification should be provided to the earthworks contractor prior to starting excavations and an inspection / testing regime agreed, along with a robust erosion and sediment control plan.

6.2 Subdivision Roading

Vegetation, any organic or deleterious material, topsoil and non-engineered fill under pavement areas should be removed from the site prior to aggregate placement. Based on our observations during testing, we consider the native ground below the topsoil at the site should provide an adequate subgrade for the proposed pavement areas.

6.3 Stormwater Control

Concentrated stormwater flows from all impermeable areas must be collected and carried in sealed pipes to the Council system or an alternative disposal point subject to approval from Council. Uncontrolled stormwater must not be allowed to saturate the ground as this will potentially affect future foundation performance both statically and during future seismic activity.

6.4 Foundations

Foundations for future proposed residential dwellings within the subdivision may comprise shallow pad, strip, or slab foundations designed in accordance with the provisions of NZS 3604 Timber Framed Buildings.

Site specific testing will be required for Building Consent, to confirm the bearing materials and capacity. For preliminary design, we anticipate that a geotechnical Ultimate Bearing Capacity of 300 kPa may be assumed for foundations bearing on native sandy gravel or engineered fill, below any topsoil. All topsoil shall be stripped from within building footprints. We anticipate building pad excavations to be typically 0.3 m depth based on our subsurface investigations.

6.5 Additional Considerations

The following should also be considered in further stages of the development:

- Development of an earthworks specification addressing site grading.
- Review of the geotechnical aspects of the site grading and foundation plans.
- Geotechnical observations and testing during construction.
- Lot specific geotechnical reports.

7 References

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Forsyth, P., Barrell, D. J., & Jongens, R. (2008). Sheet 16 - Geology of the Christchurch Area 1:250,000. Lower Hutt: Institute of Geological and Nuclear Sciences.

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Pettinga J.R., Yetton M.D., Van Dissen R.J., & Downes G. (2001). Earthquake Source Identification and Characterisation for the Canterbury Region, South Island, New Zealand. Bulletin of the New Zealand Society for Earthquake Engineering, Vol 34, No. 4, pp 282-317.

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The Ministry of Business, Innovation, and Employment (2016). New Zealand Geotechnical Database. Retrieved August 2020, from https://www.nzgd.org.nz.

8 Limitations

i. We have prepared this report in accordance with the brief as provided. This report has been prepared for the use of our client, Hughes Developments Ltd, their professional advisers and the relevant Territorial Authorities in relation to the specified project brief described in this report. No liability is accepted for the use of any part of the report for any other purpose or by any other person or entity.

ii. The recommendations in this report are based on the ground conditions indicated from published sources, site assessments and subsurface investigations described in this report based on accepted normal methods of site investigations. Only a limited amount of information has been collected to meet the specific financial and technical requirements of the client's brief and this report does not purport to completely describe all the site characteristics and properties. The nature and continuity of the ground between test locations has been inferred using experience and judgement and it should be appreciated that actual conditions could vary from the assumed model.

iii. Subsurface conditions relevant to construction works should be assessed by contractors who can make their own interpretation of the factual data provided. They should perform any additional tests as necessary for their own purposes.

iv. This Limitation should be read in conjunction with the Engineering NZ/ACENZ Standard Terms of Engagement.

v. This report is not to be reproduced either wholly or in part without our prior written permission.

We trust that this information meets your current requirements. Please do not hesitate to contact the undersigned on (03) 328 9012 if you require any further information.

Report prepared by

Jed Watts

Engineering Geologist

Report reviewed by

Don Bruggers, CMEngNZ (CPEng)

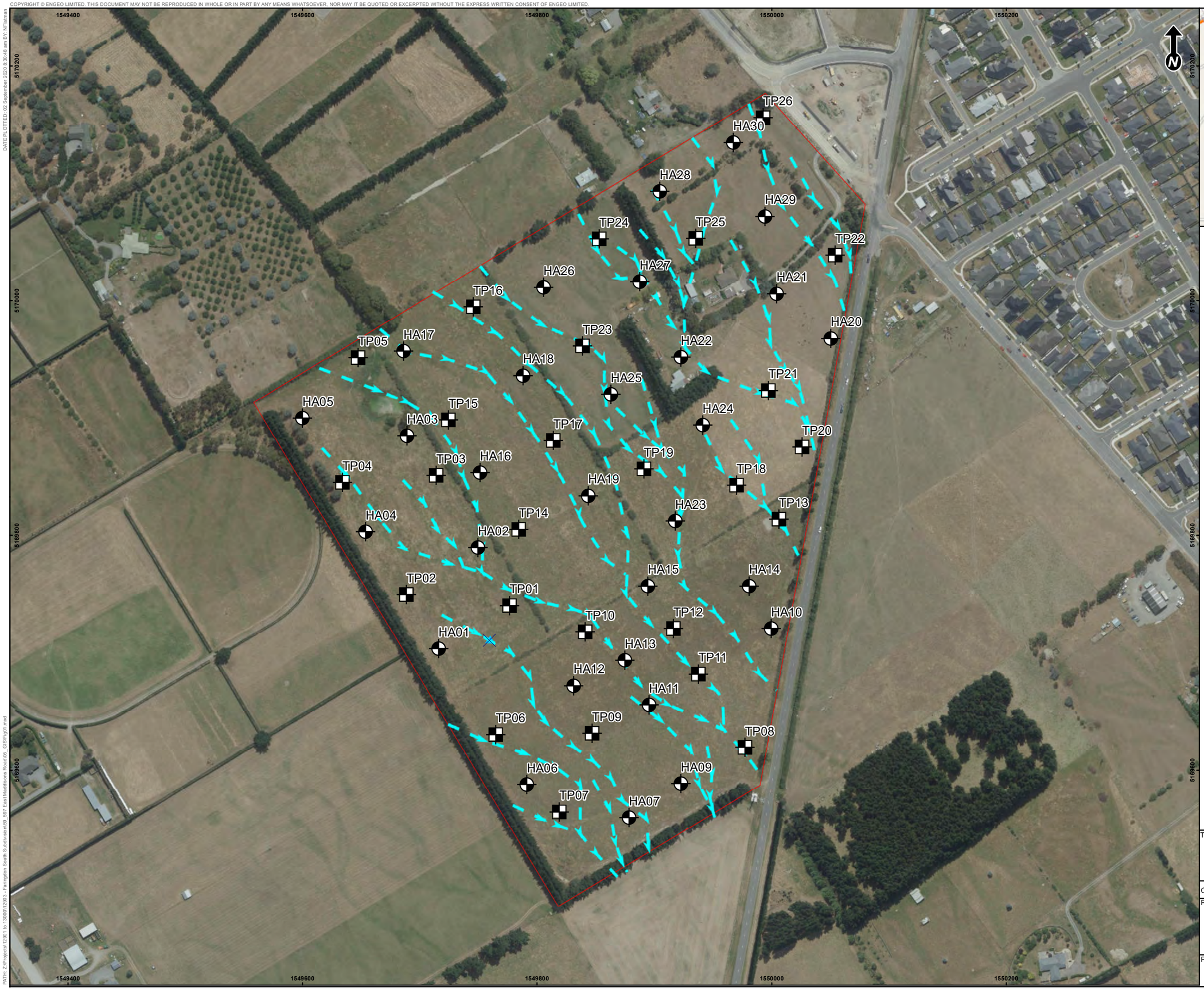
Principal Engineer

APPENDIX 1:

Site Plan and Inferred Paleo Channels

DATE PLOTTED: 02 September 2020 8:30:48 am BY: NFlatman

PATH: Z:\Projects\12901 to 13000\12903 - Farringdon South Subdivision\09_597 East Maddisons Road\05_GIS\Fig01.mxd



Legend

- Hand auger locations
- Test pit locations
- Flow paths
- Site boundary

Aerial: LINZ and Eagle Technology, CC BY 4.0.
Map image: Eagle Technology.

0 50 100
Metres

PROJECTION: NZGD 2000 New Zealand Transverse Mercator

ENGEO

Christchurch Office
124 Montreal Street Sydenham, Christchurch 8023
Tel: 03 328 9012, www.engeo.co.nz

Title: Geotechnical Site Location Plan

Client: Hughes Developments		Figure No: 1
Project: 597 East Maddisons Road Rolleston	Designed: NF Drawn: NF Checked: DRAFT Date: Sep 20	Size: A3
Proj No: 12903.000.005	Scale: 1:3,000	Revision: A

ORIGINAL FIGURE PRINTED IN COLOUR

APPENDIX 2:

ENGEO Hand Auger and Test Pit Logs

LOG OF TEST PIT TP01

Geotechnical Investigation
597 East Maddisons Road
Faringdon
12903

Client : Hughes Developments Ltd
Date : 27/08/2020
Max Test Pit Depth : 1.95 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size : 500 mm

Shear Vane No : N/A
Logged By : JC/RB/JW
Reviewed By : JRW
Latitude : 172.37761
Longitude : -43.62372

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier – Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
0.0	TOPSOIL		SM	Silty fine to medium SAND with trace gravel and rootlets; brown. Poorly graded [TOPSOIL].					L		
0.5	ALLUVIUM		GW	Sandy fine to coarse GRAVEL with minor cobbles; greyish brown. Well graded, subrounded to rounded. Sand, fine to coarse. Rootlets encountered up to 0.6 m depth.				M	Tightly Packed		
1.0											
1.5								W			
2.0				Depth of Excavation: 1.95 m Termination Condition: Target depth							

Test pit met target depth at 1.95 m.
Scala Penetrometer met practical refusal at 0.4 m depth.
Standing groundwater was not encountered

GEOTECH TEST PIT LOG 597 EAST MADDISONS ROAD - TP LOGS.GPJ NZ MASTER DATA TEMPLATE.GDT 3/9/20

LOG OF TEST PIT TP02

Geotechnical Investigation
597 East Maddisons Road
Faringdon
12903

Client : Hughes Developments Ltd
Date : 27/08/2020
Max Test Pit Depth : 2 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size : 500 mm

Shear Vane No : N/A
Logged By : JC/RB/JW
Reviewed By : JRW
Latitude : 172.37648
Longitude : -43.62369

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier – Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
0	TOPSOIL		SM	Silty fine to medium SAND with trace gravel and rootlets; brown. Poorly graded [TOPSOIL].					L		>>
0.5	ALLUVIUM		GW	Sandy fine to coarse GRAVEL with minor cobbles; greyish brown. Well graded, subrounded to rounded. Sand, fine to coarse. Rootlets encountered up to 0.6 m depth.				M	Tightly Packed		
1.0											
1.5								W			
2.0				Depth of Excavation: 2 m Termination Condition: Target depth							

Test pit met target depth at 2 m.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered

GEOTECH TEST PIT LOG 597 EAST MADDISONS ROAD - TP LOGS.GPJ NZ MASTER DATA TEMPLATE.GDT 3/9/20

LOG OF TEST PIT TP03

Geotechnical Investigation
597 East Maddisons Road
Faringdon
12903

Client : Hughes Developments Ltd
Date : 27/08/2020
Max Test Pit Depth : 1.9 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size : 500 mm

Shear Vane No : N/A
Logged By : JC/RB/JW
Reviewed By : JRW
Latitude : 172.37681
Longitude : -43.62288

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0.0	TOPSOIL		SM	Silty fine to medium SAND with trace gravel and rootlets; brown. Poorly graded [TOPSOIL].					L		
0.5	ALLUVIUM		GW	Sandy fine to coarse GRAVEL with minor cobbles; greyish brown. Well graded, subrounded to rounded. Sand, fine to coarse. Rootlets encountered up to 0.6 m depth.				M	Tightly Packed		
1.0											
1.5								W			
2.0				Depth of Excavation: 1.9 m Termination Condition: Target depth							

Scala Penetrometer: Blows per 100mm — 2 4 6 8 10 12 (>>)

Test pit met target depth at 1.9 m.
Scala Penetrometer met practical refusal at 0.5 m depth.
Standing groundwater was not encountered

LOG OF TEST PIT TP04

Geotechnical Investigation
597 East Maddisons Road
Faringdon
12903

Client : Hughes Developments Ltd
Date : 27/08/2020
Max Test Pit Depth : 2 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size : 500 mm

Shear Vane No : N/A
Logged By : JC/RB/JW
Reviewed By : JRW
Latitude : 172.37574
Longitude : -43.62268

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0	TOPSOIL		SM	Silty fine to medium SAND with trace gravel and rootlets; brown. Poorly graded [TOPSOIL].					L-MD		
0.5	ALLUVIUM		GW	Sandy fine to coarse GRAVEL with minor cobbles; greyish brown. Well graded, subrounded to rounded. Sand, fine to coarse. Rootlets encountered up to 0.5 m depth.				M	Tightly Packed		
1.0											
1.5								W			
2.0				Depth of Excavation: 2 m Termination Condition: Target depth							

Test pit met target depth at 2 m.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered

GEOTECH TEST PIT LOG 597 EAST MADDISONS ROAD - TP LOGS.GPJ NZ MASTER DATA TEMPLATE.GDT 3/9/20

LOG OF TEST PIT TP05

Geotechnical Investigation
597 East Maddisons Road
Faringdon
12903

Client : Hughes Developments Ltd
Date : 27/08/2020
Max Test Pit Depth : 2 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size : 500 mm

Shear Vane No : N/A
Logged By : JC/RB/JW
Reviewed By : JRW
Latitude : 172.37715
Longitude : -43.62459

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0	TOPSOIL		SM	Silty fine to medium SAND with trace gravel and rootlets; brown. Poorly graded [TOPSOIL].					L-MD		
0.5	ALLUVIUM		GW	Sandy fine to coarse GRAVEL with minor cobbles; greyish brown. Well graded, subrounded to rounded. Sand, fine to coarse. Rootlets encountered up to 0.5 m depth.				M	Tightly Packed		
1.0											
1.5								W			
2.0				Depth of Excavation: 2 m Termination Condition: Target depth							

Test pit met target depth at 2 m.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered

LOG OF TEST PIT TP06

Geotechnical Investigation
597 East Maddisons Road
Faringdon
12903

Client : Hughes Developments Ltd
Date : 27/08/2020
Max Test Pit Depth : 2.1 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size : 500 mm

Shear Vane No : N/A
Logged By : JC/RB/JW
Reviewed By : JRW
Latitude : 172.37715
Longitude : -43.62459

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0.0	TOPSOIL		SM	Silty fine to medium SAND with trace gravel and rootlets; brown. Poorly graded [TOPSOIL].					L		
0.5	ALLUVIUM		GW	Sandy fine to coarse GRAVEL with trace cobbles; greyish brown. Well graded, subrounded to rounded. Sand, fine to coarse. Rootlets encountered up to 0.5 m depth.				M	Tightly Packed		
1.0											
1.5								W			
2.0				Depth of Excavation: 2.1 m Termination Condition: Target depth							

Test pit met target depth at 2.1 m.
Scala Penetrometer met practical refusal at 0.5 m depth.
Standing groundwater was not encountered

GEOTECH TEST PIT LOG 597 EAST MADDISONS ROAD - TP LOGS.GPJ NZ MASTER DATA TEMPLATE.GDT 3/9/20

LOG OF TEST PIT TP07

Geotechnical Investigation
597 East Maddisons Road
Faringdon
12903

Client : Hughes Developments Ltd
Date : 27/08/2020
Max Test Pit Depth : 2.1 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size : 500 mm
Shear Vane No : N/A
Logged By : JC/RB/JW
Reviewed By : JRW
Latitude : 172.37798
Longitude : -43.62523

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0.0	TOPSOIL		SM	Silty fine to medium SAND with trace gravel and rootlets; brown. Poorly graded [TOPSOIL].					L-MD		
0.5	ALLUVIUM		GW	Sandy fine to coarse GRAVEL with trace cobbles; greyish brown. Well graded, subrounded to rounded. Sand, fine to coarse. Rootlets encountered up to 0.6 m depth.				M	Tightly Packed		
1.0				Lens of loosely packed coarse gravel with limited fines approximately 100 mm thick encountered at 1.1 m depth.							
1.5				Lens of loosely packed coarse gravel with limited fines approximately 100 mm thick encountered at 1.7 m depth.				W			
2.0				Depth of Excavation: 2.1 m Termination Condition: Target depth							

Test pit met target depth at 2.1 m.
Scala Penetrometer met practical refusal at 0.4 m depth.
Standing groundwater was not encountered

LOG OF TEST PIT TP08

Geotechnical Investigation
597 East Maddisons Road
Faringdon
12903

Client : Hughes Developments Ltd
Date : 27/08/2020
Max Test Pit Depth : 2.1 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size : 500 mm

Shear Vane No : N/A
Logged By : JC/RB/JW
Reviewed By : JRW
Latitude : 172.37998
Longitude : -43.62481

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier – Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
0.0	TOPSOIL		SM	Silty fine to medium SAND with trace gravel and rootlets; brown. Poorly graded [TOPSOIL].					L-MD		
0.5	ALLUVIUM		GW	Sandy fine to coarse GRAVEL with trace cobbles; greyish brown. Well graded, subrounded to rounded. Sand, fine to coarse.				M	Tightly Packed		
1.0											
1.5								W			
2.0				Depth of Excavation: 2.1 m Termination Condition: Target depth							

Test pit met target depth at 2.1 m.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered

GEOTECH TEST PIT LOG 597 EAST MADDISONS ROAD - TP LOGS.GPJ NZ MASTER DATA TEMPLATE.GDT 3/9/20

LOG OF TEST PIT TP09

Geotechnical Investigation
597 East Maddisons Road
Faringdon
12903

Client : Hughes Developments Ltd
Date : 27/08/2020
Max Test Pit Depth : 2.1 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size : 500 mm

Shear Vane No : N/A
Logged By : JC/RB/JW
Reviewed By : JRW
Latitude : 172.37847
Longitude : -43.62461

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0.0	TOPSOIL		SM	Silty fine to medium SAND with trace gravel and rootlets; brown. Poorly graded [TOPSOIL].					L-MD		
0.5	ALLUVIUM		GW	Sandy fine to coarse GRAVEL with trace cobbles; greyish brown. Well graded, subrounded to rounded. Sand, fine to coarse.				M	Tightly Packed		
1.0											
1.5								W			
2.0				Depth of Excavation: 2.1 m Termination Condition: Target depth							

Scala Penetrometer: Blows per 100mm — 2 4 6 8 10 12

Test pit met target depth at 2.1 m.
Scala Penetrometer met practical refusal at 0.4 m depth.
Standing groundwater was not encountered

GEOTECH TEST PIT LOG 597 EAST MADDISONS ROAD - TP LOGS.GPJ NZ MASTER DATA TEMPLATE.GDT 3/9/20

LOG OF TEST PIT TP10

Geotechnical Investigation
597 East Maddisons Road
Faringdon
12903

Client : Hughes Developments Ltd
Date : 27/08/2020
Max Test Pit Depth : 2.2 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size : 500 mm

Shear Vane No : N/A
Logged By : JC/RB/JW
Reviewed By : JRW
Latitude : 172.37831
Longitude : -43.62379

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0.0	TOPSOIL		SM	Silty fine to medium SAND with trace gravel and rootlets; brown. Poorly graded [TOPSOIL].					L-MD		
0.3	ALLUVIUM		SM	Silty fine to medium SAND with trace rootlets; light brown with orange mottles. Poorly graded.					MD		
0.5			GW	Sandy fine to coarse GRAVEL with trace cobbles; greyish brown. Well graded, subrounded to rounded. Sand, fine to coarse.				M	Tightly Packed		
1.0											
1.5								W			
2.0				Lens of loosely packed coarse gravel with limited fines approximately 100 mm thick encountered at 2.0 m depth.							
				Depth of Excavation: 2.2 m Termination Condition: Target depth							

Scala Penetrometer: Blows per 100mm — 2, 4, 6, 8, 10, 12

Test pit met target depth at 2.2 m.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered

GEOTECH TEST PIT LOG 597 EAST MADDISONS ROAD - TP LOGS.GPJ NZ MASTER DATA TEMPLATE.GDT 3/9/20

LOG OF TEST PIT TP11

Geotechnical Investigation
597 East Maddisons Road
Faringdon
12903

Client : Hughes Developments Ltd
Date : 27/08/2020
Max Test Pit Depth : 2.1 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size : 500 mm

Shear Vane No : N/A
Logged By : JC/RB/JW
Reviewed By : JRW
Latitude : 172.37929
Longitude : -43.62371

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier – Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
0.0	TOPSOIL		SM	Silty fine to medium SAND with trace gravel and rootlets; brown. Poorly graded [TOPSOIL].					L-MD		
0.5	ALLUVIUM		GW	Sandy fine to coarse GRAVEL with trace cobbles; greyish brown. Well graded, subrounded to rounded. Sand, fine to coarse.				M	Tightly Packed		
1.0											
1.5								W			
2.0				Depth of Excavation: 2.1 m Termination Condition: Target depth							

Test pit met target depth at 2.1 m.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered

GEOTECH TEST PIT LOG 597 EAST MADDISONS ROAD - TP LOGS.GPJ NZ MASTER DATA TEMPLATE.GDT 3/9/20

LOG OF TEST PIT TP12

Geotechnical Investigation
597 East Maddisons Road
Faringdon
12903

Client : Hughes Developments Ltd
Date : 27/08/2020
Max Test Pit Depth : 2.1 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size : 500 mm

Shear Vane No : N/A
Logged By : JC/RB/JW
Reviewed By : JRW
Latitude : 172.37963
Longitude : -43.62408

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier – Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
0.0	T		SM	Silty fine to medium SAND with trace gravel and rootlets; brown. Poorly graded [TOPSOIL].					L-MD		
0.5	ALLUVIUM		GW	Sandy fine to coarse GRAVEL with trace cobbles; greyish brown. Well graded, subrounded to rounded. Sand, fine to coarse.				M	Tightly Packed		
1.0											
1.5								W			
2.0				Depth of Excavation: 2.1 m Termination Condition: Target depth							

Test pit met target depth at 2.1 m.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered

GEOTECH TEST PIT LOG 597 EAST MADDISONS ROAD - TP LOGS.GPJ NZ MASTER DATA TEMPLATE.GDT 3/9/20

LOG OF TEST PIT TP13

Geotechnical Investigation
597 East Maddisons Road
Faringdon
12903

Client : Hughes Developments Ltd
Date : 27/08/2020
Max Test Pit Depth : 2 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size : 500 mm

Shear Vane No : N/A
Logged By : JC/RB/JW
Reviewed By : JRW
Latitude : 172.38028
Longitude : -43.62302

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
0.0	TOPSOIL		SM	Silty fine to medium SAND with trace gravel and rootlets; brown. Poorly graded [TOPSOIL].					MD		
	ALLUVIUM			Sandy fine to coarse GRAVEL with trace cobbles; greyish brown. Well graded, subrounded to rounded. Sand, fine to coarse.				M			
0.5											
1.0			GW						Tightly Packed		
1.5								W			
2.0				Depth of Excavation: 2 m Termination Condition: Target depth							

Test pit met target depth at 2 m.
Scala Penetrometer met practical refusal at 0.2 m depth.
Standing groundwater was not encountered
T = TOPSOIL

T = TOPSOIL

GEOTECH TEST PIT LOG 597 EAST MADDISONS ROAD - TP LOGS.GPJ NZ MASTER DATA TEMPLATE.GDT 3/9/20

LOG OF TEST PIT TP14

Geotechnical Investigation
597 East Maddisons Road
Faringdon
12903

Client : Hughes Developments Ltd
Date : 27/08/2020
Max Test Pit Depth : 1.9 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size : 500 mm

Shear Vane No : N/A
Logged By : JC/RB/JW
Reviewed By : JRW
Latitude : 172.37768
Longitude : -43.62311

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier – Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
0.0	TOPSOIL		ML	SILT with minor sand; brown. Low plasticity. Sand, fine [TOPSOIL].					St-VSt		>>
0.5	ALLUVIUM		GW	Sandy fine to coarse GRAVEL with minor cobbles; greyish brown. Well graded, subrounded to rounded. Sand, fine to coarse. Rootlets encountered up to 0.6 m depth.				M	Tightly Packed		
1.0											
1.5								W			
2.0				Depth of Excavation: 1.9 m Termination Condition: Target depth							

Test pit met target depth at 1.9 m.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered

GEOTECH TEST PIT LOG 597 EAST MADDISONS ROAD - TP LOGS.GPJ NZ MASTER DATA TEMPLATE.GDT 3/9/20

LOG OF TEST PIT TP15

Geotechnical Investigation
597 East Maddisons Road
Faringdon
12903

Client : Hughes Developments Ltd
Date : 27/08/2020
Max Test Pit Depth : 1.9 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size : 500 mm
Shear Vane No : N/A
Logged By : JC/RB/JW
Reviewed By : JRW
Latitude : 172.37693
Longitude : -43.6222

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0.0	TOPSOIL		ML	SILT with minor sand; brown. Low plasticity. Sand, fine [TOPSOIL].					St-VSt		
0.5	ALLUVIUM		GW	Sandy fine to coarse GRAVEL with minor cobbles; greyish brown. Well graded, subrounded to rounded. Sand, fine to coarse. Rootlets encountered up to 0.6 m depth.				M	Tightly Packed		
1.0											
1.5								W			
2.0				Depth of Excavation: 1.9 m Termination Condition: Target depth							

Test pit met target depth at 1.9 m.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered

GEOTECH TEST PIT LOG 597 EAST MADDISONS ROAD - TP LOGS.GPJ NZ MASTER DATA TEMPLATE.GDT 3/9/20

LOG OF TEST PIT TP16

Geotechnical Investigation
597 East Maddisons Road
Faringdon
12903

Client : Hughes Developments Ltd
Date : 27/08/2020
Max Test Pit Depth : 1.9 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size : 500 mm
Shear Vane No : N/A
Logged By : JC/RB/JW
Reviewed By : JRW
Latitude : 172.37714
Longitude : -43.62138

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier – Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
0.0	TOPSOIL		ML	SILT with minor sand; brown. Low plasticity. Sand, fine [TOPSOIL].					St-VSt		>>
0.5	ALLUVIUM		GW	Sandy fine to coarse GRAVEL with minor cobbles; greyish brown. Well graded, subrounded to rounded. Sand, fine to coarse. Rootlets encountered up to 0.6 m depth.				M	Tightly Packed		
1.0											
1.5								W			
2.0				Depth of Excavation: 1.9 m Termination Condition: Target depth							

Test pit met target depth at 1.9 m.
Scala Penetrometer met practical refusal at 0.4 m depth.
Standing groundwater was not encountered

GEOTECH TEST PIT LOG 597 EAST MADDISONS ROAD - TP LOGS.GPJ NZ MASTER DATA TEMPLATE.GDT 3/9/20

LOG OF TEST PIT TP17

Geotechnical Investigation
597 East Maddisons Road
Faringdon
12903

Client : Hughes Developments Ltd
Date : 27/08/2020
Max Test Pit Depth : 1.9 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size : 500 mm

Shear Vane No : N/A
Logged By : JC/RB/JW
Reviewed By : JRW
Latitude : 172.378
Longitude : -43.62249

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0.0	TOPSOIL		ML	SILT with minor sand; brown. Low plasticity. Sand, fine [TOPSOIL].					St-VSt		
0.5	ALLUVIUM		GW	Sandy fine to coarse GRAVEL with minor cobbles; greyish brown. Well graded, subrounded to rounded. Sand, fine to coarse. Rootlets encountered up to 0.6 m depth.				M	Tightly Packed		
1.0											
1.5								W			
2.0				Depth of Excavation: 1.9 m Termination Condition: Target depth							

Test pit met target depth at 1.9 m.
Scala Penetrometer met practical refusal at 0.5 m depth.
Standing groundwater was not encountered

GEOTECH TEST PIT LOG 597 EAST MADDISONS ROAD - TP LOGS.GPJ NZ MASTER DATA TEMPLATE.GDT 3/9/20

LOG OF TEST PIT TP18

Geotechnical Investigation
597 East Maddisons Road
Faringdon
12903

Client : Hughes Developments Ltd **Shear Vane No** : N/A
Date : 28/08/2020 **Logged By** : JC/RB/JW
Max Test Pit Depth : 2.2 m **Reviewed By** : JRW
Digger Type/Size : Bucket Excavator **Latitude** : 172.38001
Bucket Type/Size : 500 mm **Longitude** : -43.62263

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0	TS		ML	SILT with minor sand; brown. Low plasticity. Sand, fine [TOPSOIL].					St-VSt		
	ALLUVIUM		SP	Fine to medium SAND with minor silt; greyish brown. Poorly graded.					MD		
0.5			GW	Sandy fine to coarse GRAVEL with trace cobbles; greyish brown. Well graded, subrounded to rounded. Sand, fine to coarse.				M	Tightly Packed		
1.0											
1.5				Cobbles become minor from 1.5 m depth.				W			
2.0				Depth of Excavation: 2.2 m Termination Condition: Target depth							

Scala Penetrometer: Blows per 100mm — 2 4 6 8 10 12 (>>)

Test pit met target depth at 2.2 m.
Scala Penetrometer met practical refusal at 0.5 m depth.
Standing groundwater was not encountered
TS = TOPSOIL

TS = TOPSOIL

LOG OF TEST PIT TP19

Geotechnical Investigation
597 East Maddisons Road
Faringdon
12903

Client : Hughes Developments Ltd
Date : 28/08/2020
Max Test Pit Depth : 2 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size : 500 mm

Shear Vane No : N/A
Logged By : JC/RB/JW
Reviewed By : JRW
Latitude : 172.37898
Longitude : -43.62251

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier – Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
0	TOPSOIL		ML	SILT with minor sand; brown. Low plasticity. Sand, fine [TOPSOIL].					VSt		
0.5	ALLUVIUM		GW	Sandy fine to coarse GRAVEL with trace cobbles; greyish brown. Well graded, subrounded to rounded. Sand, fine to coarse. Rootlets encountered up to 0.6 m depth.				M	Tightly Packed		
1.0											
1.5								W			
2.0				Depth of Excavation: 2 m Termination Condition: Target depth							

Test pit met target depth at 2 m.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered

LOG OF TEST PIT TP20

Geotechnical Investigation
597 East Maddisons Road
Faringdon
12903

Client : Hughes Developments Ltd
Date : 28/08/2020
Max Test Pit Depth : 2 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size : 500 mm
Shear Vane No : N/A
Logged By : JC/RB/JW
Reviewed By : JRW
Latitude : 172.38064
Longitude : -43.62236

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier – Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
0	TOPSOIL		ML	SILT with minor sand; brown. Low plasticity. Sand, fine [TOPSOIL].					St-VSt		
			SP	Fine to medium SAND with minor silt; greyish brown. Poorly graded.					MD		
0.5	ALLUVIUM		GW	Sandy fine to coarse GRAVEL with trace cobbles; greyish brown. Well graded, subrounded to rounded. Sand, fine to coarse. Rootlets encountered up to 0.6 m depth.				M	Tightly Packed		
1.0											
1.5								W			
2.0				Depth of Excavation: 2 m Termination Condition: Target depth							

Test pit met target depth at 2 m.
Scala Penetrometer met practical refusal at 0.6 m depth.
Standing groundwater was not encountered

GEOTECH TEST PIT LOG 597 EAST MADDISONS ROAD - TP LOGS.GPJ NZ MASTER DATA TEMPLATE.GDT 3/9/20

LOG OF TEST PIT TP21

Geotechnical Investigation
597 East Maddisons Road
Faringdon
12903

Client : Hughes Developments Ltd
Date : 28/08/2020
Max Test Pit Depth : 2.1 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size : 500 mm

Shear Vane No : N/A
Logged By : JC/RB/JW
Reviewed By : JRW
Latitude : 172.38041
Longitude : -43.62195

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0	TOPSOIL		ML	SILT with minor sand; brown. Low plasticity. Sand, fine [TOPSOIL].					St-VSt		
			SP	Fine to medium SAND with minor silt; greyish brown. Poorly graded.					L-MD		
0.5	ALLUVIUM		GW	Sandy fine to coarse GRAVEL with trace cobbles; greyish brown. Well graded, subrounded to rounded. Sand, fine to coarse.				M	Tightly Packed		
1.0											
1.5				Sand lens from 1.6 m to 1.8 m depth observed in the side wall of the test pit.				W			
2.0				Depth of Excavation: 2.1 m Termination Condition: Target depth							

Test pit met target depth at 2.1 m.
Scala Penetrometer met practical refusal at 0.5 m depth.
Standing groundwater was not encountered

GEOTECH TEST PIT LOG 597 EAST MADDISONS ROAD - TP LOGS.GPJ NZ MASTER DATA TEMPLATE.GDT 3/9/20

LOG OF TEST PIT TP22

Geotechnical Investigation
597 East Maddisons Road
Faringdon
12903

Client : Hughes Developments Ltd
Date : 28/08/2020
Max Test Pit Depth : 2 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size : 500 mm

Shear Vane No : N/A
Logged By : JC/RB/JW
Reviewed By : JRW
Latitude : 172.3809
Longitude : -43.621

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0	TOPSOIL		ML	SILT with minor sand; brown. Low plasticity. Sand, fine [TOPSOIL].					St-VSt		
0.5	ALLUVIUM		GW	Sandy fine to coarse GRAVEL with trace cobbles; greyish brown. Well graded, subrounded to rounded. Sand, fine to coarse. Rootlets encountered up to 0.6 m depth.				M	Tightly Packed		
1.0											
1.5				Cobbles become minor from 1.5 m depth.				W			
2.0				Depth of Excavation: 2 m Termination Condition: Target depth							

Scala Penetrometer: Blows per 100mm — 2 4 6 8 10 12 (>>)

Test pit met target depth at 2 m.
Scala Penetrometer met practical refusal at 0.4 m depth.
Standing groundwater was not encountered

LOG OF TEST PIT TP23

Geotechnical Investigation
597 East Maddisons Road
Faringdon
12903

Client : Hughes Developments Ltd
Date : 28/08/2020
Max Test Pit Depth : 2 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size : 500 mm

Shear Vane No : N/A
Logged By : JC/RB/JW
Reviewed By : JRW
Latitude : 172.3783
Longitude : -43.62165

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0	TOPSOIL		ML	SILT with minor sand; brown. Low plasticity. Sand, fine [TOPSOIL].					L-MD		
0.5	ALLUVIUM		GW	Sandy fine to coarse GRAVEL with trace rootlets; brownish grey. Well graded, subrounded to rounded. Sand, fine to coarse.				M	Tightly Packed		
			SP	Fine to medium SAND with trace silt; greyish brown. Poorly graded.					MD-D		
1.0			GW	Sandy fine to coarse GRAVEL with trace cobbles; greyish brown. Well graded, subrounded to rounded. Sand, fine to coarse.				W	Tightly Packed		
1.5											
2.0				Depth of Excavation: 2 m Termination Condition: Target depth							

Test pit met target depth at 2 m.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered

LOG OF TEST PIT TP24

Geotechnical Investigation
597 East Maddisons Road
Faringdon
12903

Client : Hughes Developments Ltd
Date : 28/08/2020
Max Test Pit Depth : 2.2 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size : 500 mm

Shear Vane No : N/A
Logged By : JC/RB/JW
Reviewed By : JRW
Latitude : 172.37851
Longitude : -43.6208

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0.0	TS		ML	SILT with minor sand; brown. Low plasticity. Sand, fine [TOPSOIL].					St-VSt		
0.5	ALLUVIUM		GW	Sandy fine to coarse GRAVEL with trace cobbles; greyish brown. Well graded, subrounded to rounded. Sand, fine to coarse. Rootlets encountered up to 0.6 m depth.				M	Tightly Packed		
1.0											
1.5								W			
2.0				Depth of Excavation: 2.2 m Termination Condition: Target depth							

Test pit met target depth at 2.2 m.
Scala Penetrometer met practical refusal at 0.4 m depth.
Standing groundwater was not encountered
TS = TOPSOIL

TS = TOPSOIL

GEOTECH TEST PIT LOG 597 EAST MADDISONS ROAD - TP LOGS.GPJ NZ MASTER DATA TEMPLATE.GDT 3/9/20

LOG OF TEST PIT TP25

Geotechnical Investigation
597 East Maddisons Road
Faringdon
12903

Client : Hughes Developments Ltd
Date : 28/08/2020
Max Test Pit Depth : 2.1 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size : 500 mm

Shear Vane No : N/A
Logged By : JC/RB/JW
Reviewed By : JRW
Latitude : 172.37952
Longitude : -43.62084

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier – Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0	TS		ML	SILT with minor sand; brown. Low plasticity. Sand, fine [TOPSOIL].					St-VSt		
0.5	ALLUVIUM		ML	Sandy SILT; greyish brown. Low plasticity. Sand, fine to medium.				M	St-VSt		
1.0			GW	Sandy fine to coarse GRAVEL with trace cobbles; greyish brown. Well graded, subrounded to rounded. Sand, fine to coarse.				W	Tightly Packed		
1.5											
2.0				Depth of Excavation: 2.1 m Termination Condition: Target depth							

Scala Penetrometer: Blows per 100mm — 2 4 6 8 10 12 (>>)

Test pit met target depth at 2.1 m.
Scala Penetrometer met practical refusal at 0.5 m depth.
Standing groundwater was not encountered
TS = TOPSOIL

TS = TOPSOIL

GEOTECH TEST PIT LOG 597 EAST MADDISONS ROAD - TP LOGS.GPJ NZ MASTER DATA TEMPLATE.GDT 3/9/20

LOG OF TEST PIT TP26

Geotechnical Investigation
597 East Maddisons Road
Faringdon
12903

Client : Hughes Developments Ltd
Date : 28/08/2020
Max Test Pit Depth : 2 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size : 500 mm

Shear Vane No : N/A
Logged By : JC/RB/JW
Reviewed By : JRW
Latitude : 172.38036
Longitude : -43.61991

Depth (m BGL)	Material	Excavatability (Relative Scale) Easier – Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
0.0	TS		ML	SILT with minor sand; brown. Low plasticity. Sand, fine [TOPSOIL].					St-VSt		
0.5	ALLUVIUM		GW	Sandy fine to coarse GRAVEL with trace cobbles; greyish brown. Well graded, subrounded to rounded. Sand, fine to coarse. Rootlets encountered up to 0.8 m depth.				M	Tightly Packed		
1.0											
1.5								W			
2.0				Depth of Excavation: 2 m Termination Condition: Target depth							

Test pit met target depth at 2 m.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered
TS = TOPSOIL

TS = TOPSOIL

GEOTECH TEST PIT LOG 597 EAST MADDISONS ROAD - TP LOGS.GPJ NZ MASTER DATA TEMPLATE.GDT 3/9/20

LOG OF AUGER HA01

Geotechnical Investigation
597 East Maddisons Road
Faringdon
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 27/08/2020
Hole Depth : 0.3 m
Hole Diameter : 50 mm

Shear Vane No : N/A
Logged By : JC/RB/JW
Reviewed By : JRW
Latitude : 172.37683
Longitude : -43.62418

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0.1	TOPSOIL	SM	Silty fine to medium SAND with trace gravel and rootlets; brown. Poorly graded [TOPSOIL].				M	MD	
0.3			End of Hole Depth: 0.3 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.3 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered

GEOTECH HAND AUGER 597 EAST MADDISONS ROAD - HA LOGS.GPJ NZ DATA TEMPLATE 2.GDT 3/9/20

LOG OF AUGER HA02

Geotechnical Investigation
597 East Maddisons Road
Faringdon
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 27/08/2020
Hole Depth : 0.3 m
Hole Diameter : 50 mm

Shear Vane No : N/A
Logged By : JC/RB/JW
Reviewed By : JRW
Latitude : 172.37732
Longitude : -43.62332

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0.1	TOPSOIL	ML	SILT with some sand, trace gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				M	St-VSt	
0.2									
0.3			End of Hole Depth: 0.3 m Termination Condition: Practical refusal						
0.4									
0.5									
0.6									
0.7									
0.8									

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.3 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.4 m depth.
Standing groundwater was not encountered

GEOTECH HAND AUGER 597 EAST MADDISONS ROAD - HA LOGS.GPJ NZ DATA TEMPLATE 2.GDT 3/9/20

LOG OF AUGER HA03

Geotechnical Investigation
597 East Maddisons Road
Faringdon
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 27/08/2020
Hole Depth : 0.3 m
Hole Diameter : 50 mm

Shear Vane No : N/A
Logged By : JC/RB/JW
Reviewed By : JRW
Latitude : 172.37643
Longitude : -43.62237

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0.1	TOPSOIL	ML	SILT with some sand, trace gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				M	St-VSt	
0.2									
0.3			End of Hole Depth: 0.3 m Termination Condition: Practical refusal						
0.4									
0.5									
0.6									
0.7									
0.8									

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.3 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.4 m depth.
Standing groundwater was not encountered

GEOTECH HAND AUGER 597 EAST MADDISONS ROAD - HA LOGS.GPJ NZ DATA TEMPLATE 2.GDT 3/9/20

LOG OF AUGER HA04

Geotechnical Investigation
597 East Maddisons Road
Faringdon
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 27/08/2020
Hole Depth : 0.3 m
Hole Diameter : 50 mm

Shear Vane No : N/A
Logged By : JC/RB/JW
Reviewed By : JRW
Latitude : 172.37611
Longitude : -43.6232

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0.1	TOPSOIL	SM	Silty fine to medium SAND with trace gravel and rootlets; brown. Poorly graded [TOPSOIL].				M	MD	
0.2									
0.3			End of Hole Depth: 0.3 m Termination Condition: Practical refusal						
0.4									
0.5									
0.6									
0.7									
0.8									

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.3 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.4 m depth.
Standing groundwater was not encountered

GEOTECH HAND AUGER 597 EAST MADDISONS ROAD - HA LOGS.GPJ NZ DATA TEMPLATE 2.GDT 3/9/20

LOG OF AUGER HA05

Geotechnical Investigation
597 East Maddisons Road
Faringdon
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 27/08/2020
Hole Depth : 0.3 m
Hole Diameter : 50 mm

Shear Vane No : N/A
Logged By : JC/RB/JW
Reviewed By : JRW
Latitude : 172.37525
Longitude : -43.62211

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0.1	TOPSOIL	ML	SILT with some sand, trace gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				M	St-VSt	
0.2									
0.3			End of Hole Depth: 0.3 m Termination Condition: Practical refusal						
0.4									
0.5									
0.6									
0.7									
0.8									

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.3 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.4 m depth.
Standing groundwater was not encountered

GEOTECH HAND AUGER 597 EAST MADDISONS ROAD - HA LOGS.GPJ NZ DATA TEMPLATE 2.GDT 3/9/20

LOG OF AUGER HA06

Geotechnical Investigation
597 East Maddisons Road
Faringdon
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 27/08/2020
Hole Depth : 0.2 m
Hole Diameter : 50 mm

Shear Vane No : N/A
Logged By : JC/RB/JW
Reviewed By : JRW
Latitude : 172.38023
Longitude : -43.625

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0.1	TOPSOIL	ML	SILT with trace sand, gravel and rootlets; brown. Low plasticity [TOPSOIL].				M	St-VSt	
0.2			End of Hole Depth: 0.2 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.2 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered

GEOTECH HAND AUGER 597 EAST MADDISONS ROAD - HA LOGS.GPJ NZ DATA TEMPLATE 2.GDT 3/9/20

LOG OF AUGER HA07

Geotechnical Investigation
597 East Maddisons Road
Faringdon
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 27/08/2020
Hole Depth : 0.2 m
Hole Diameter : 50 mm

Shear Vane No : N/A
Logged By : JC/RB/JW
Reviewed By : JRW
Latitude : 172.37854
Longitude : -43.62532

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0.1	TOPSOIL	ML	SILT with trace sand, gravel and rootlets; brown. Low plasticity [TOPSOIL].				M	St-VSt	
0.2			End of Hole Depth: 0.2 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.2 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered

LOG OF AUGER HA08

Geotechnical Investigation
597 East Maddisons Road
Faringdon
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 27/08/2020
Hole Depth : 0.2 m
Hole Diameter : 50 mm

Shear Vane No : N/A
Logged By : JC/RB/JW
Reviewed By : JRW
Latitude : 172.37922
Longitude : -43.62507

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0.1	TOPSOIL	ML	SILT with trace sand, gravel and rootlets; brown. Low plasticity [TOPSOIL].				M	St-VSt	
0.2			End of Hole Depth: 0.2 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.2 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered

GEOTECH HAND AUGER 597 EAST MADDISONS ROAD - HA LOGS.GPJ NZ DATA TEMPLATE 2.GDT 3/9/20

LOG OF AUGER HA09

Geotechnical Investigation
597 East Maddisons Road
Faringdon
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 27/08/2020
Hole Depth : 0.3 m
Hole Diameter : 50 mm

Shear Vane No : N/A
Logged By : JC/RB/JW
Reviewed By : JRW
Latitude : 172.37909
Longitude : -43.62383

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0.1	TOPSOIL	ML	SILT with some sand, trace gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				M	St-VSt	
0.2									
0.3			End of Hole Depth: 0.3 m Termination Condition: Practical refusal						
0.4									
0.5									
0.6									
0.7									
0.8									

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.3 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered

GEOTECH HAND AUGER 597 EAST MADDISONS ROAD - HA LOGS.GPJ NZ DATA TEMPLATE 2.GDT 3/9/20

LOG OF AUGER HA10

Geotechnical Investigation
597 East Maddisons Road
Faringdon
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 27/08/2020
Hole Depth : 0.2 m
Hole Diameter : 50 mm

Shear Vane No : N/A
Logged By : JC/RB/JW
Reviewed By : JRW
Latitude : 172.37909
Longitude : -43.62435

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0.1	TOPSOIL	ML	SILT with trace sand, gravel and rootlets; brown. Low plasticity [TOPSOIL].				M	St-VSt	
0.2			End of Hole Depth: 0.2 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.2 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered

GEOTECH HAND AUGER 597 EAST MADDISONS ROAD - HA LOGS.GPJ NZ DATA TEMPLATE 2.GDT 3/9/20

LOG OF AUGER HA11

Geotechnical Investigation
597 East Maddisons Road
Faringdon
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 27/08/2020
Hole Depth : 0.2 m
Hole Diameter : 50 mm

Shear Vane No : N/A
Logged By : JC/RB/JW
Reviewed By : JRW
Latitude : 172.37797
Longitude : -43.62428

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0.1	TOPSOIL	ML	SILT with trace sand, gravel and rootlets; brown. Low plasticity [TOPSOIL].				M	St-VSt	
0.2			End of Hole Depth: 0.2 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.2 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered

GEOTECH HAND AUGER 597 EAST MADDISONS ROAD - HA LOGS.GPJ NZ DATA TEMPLATE 2.GDT 3/9/20

LOG OF AUGER HA12

Geotechnical Investigation
597 East Maddisons Road
Faringdon
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 27/08/2020
Hole Depth : 0.2 m
Hole Diameter : 50 mm

Shear Vane No : N/A
Logged By : JC/RB/JW
Reviewed By : JRW
Latitude : 172.37868
Longitude : -43.62398

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0.1	TOPSOIL	ML	SILT with trace sand, gravel and rootlets; brown. Low plasticity [TOPSOIL].				M	St-VSt	
0.2			End of Hole Depth: 0.2 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.2 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered

GEOTECH HAND AUGER 597 EAST MADDISONS ROAD - HA LOGS.GPJ NZ DATA TEMPLATE 2.GDT 3/9/20

LOG OF AUGER HA13

Geotechnical Investigation
597 East Maddisons Road
Faringdon
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 27/08/2020
Hole Depth : 0.2 m
Hole Diameter : 50 mm

Shear Vane No : N/A
Logged By : JC/RB/JW
Reviewed By : JRW
Latitude : 172.38005
Longitude : -43.62343

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0.1	TOPSOIL	ML	SILT with trace sand, gravel and rootlets; brown. Low plasticity [TOPSOIL].				M	St-VSt	
0.2			End of Hole Depth: 0.2 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.2 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered

GEOTECH HAND AUGER 597 EAST MADDISONS ROAD - HA LOGS.GPJ NZ DATA TEMPLATE 2.GDT 3/9/20

LOG OF AUGER HA14

Geotechnical Investigation
597 East Maddisons Road
Faringdon
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 27/08/2020
Hole Depth : 0.2 m
Hole Diameter : 50 mm

Shear Vane No : N/A
Logged By : JC/RB/JW
Reviewed By : JRW
Latitude : 172.37897
Longitude : -43.62349

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0.1	TOPSOIL	ML	SILT with trace sand, gravel and rootlets; brown. Low plasticity [TOPSOIL].				M	St-VSt	
0.2			End of Hole Depth: 0.2 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.2 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered

GEOTECH HAND AUGER 597 EAST MADDISONS ROAD - HA LOGS.GPJ NZ DATA TEMPLATE 2.GDT 3/9/20

LOG OF AUGER HA15

Geotechnical Investigation
597 East Maddisons Road
Faringdon
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 27/08/2020
Hole Depth : 0.3 m
Hole Diameter : 50 mm

Shear Vane No : N/A
Logged By : JC/RB/JW
Reviewed By : JRW
Latitude : 172.3774
Longitude : 43.62267

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0.1	TOPSOIL	ML	SILT with some sand, trace gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				M	St-VSt	
0.2									
0.3			End of Hole Depth: 0.3 m Termination Condition: Practical refusal						
0.4									
0.5									
0.6									
0.7									
0.8									

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.3 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered

GEOTECH HAND AUGER 597 EAST MADDISONS ROAD - HA LOGS.GPJ NZ DATA TEMPLATE 2.GDT 3/9/20

LOG OF AUGER HA16

Geotechnical Investigation
597 East Maddisons Road
Faringdon
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 27/08/2020
Hole Depth : 0.3 m
Hole Diameter : 50 mm

Shear Vane No : N/A
Logged By : JC/RB/JW
Reviewed By : JRW
Latitude : 172.37647
Longitude : -43.62162

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0.1	TOPSOIL	ML	SILT with some sand, trace gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				M	St-VSt	
0.2									
0.3			End of Hole Depth: 0.3 m Termination Condition: Practical refusal						
0.4									
0.5									
0.6									
0.7									
0.8									

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.3 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered

GEOTECH HAND AUGER 597 EAST MADDISONS ROAD - HA LOGS.GPJ NZ DATA TEMPLATE 2.GDT 3/9/20

LOG OF AUGER HA17

Geotechnical Investigation
597 East Maddisons Road
Faringdon
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 27/08/2020
Hole Depth : 0.3 m
Hole Diameter : 50 mm

Shear Vane No : N/A
Logged By : JC/RB/JW
Reviewed By : JRW
Latitude : 172.37759
Longitude : -43.62193

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0.1	TOPSOIL	ML	SILT with some sand, trace gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				M	St-VSt	
0.2									
0.3			End of Hole Depth: 0.3 m Termination Condition: Practical refusal						
0.4									
0.5									
0.6									
0.7									
0.8									

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.3 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.4 m depth.
Standing groundwater was not encountered

GEOTECH HAND AUGER 597 EAST MADDISONS ROAD - HA LOGS.GPJ NZ DATA TEMPLATE 2.GDT 3/9/20

LOG OF AUGER HA18

Geotechnical Investigation
597 East Maddisons Road
Faringdon
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 27/08/2020
Hole Depth : 0.3 m
Hole Diameter : 50 mm

Shear Vane No : N/A
Logged By : JC/RB/JW
Reviewed By : JRW
Latitude : 172.3784
Longitude : -43.62284

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0.1	TOPSOIL	ML	SILT with some sand, trace gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				M	St-VSt	
0.2									
0.3			End of Hole Depth: 0.3 m Termination Condition: Practical refusal						
0.4									
0.5									
0.6									
0.7									
0.8									

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.3 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered

GEOTECH HAND AUGER 597 EAST MADDISONS ROAD - HA LOGS.GPJ NZ DATA TEMPLATE 2.GDT 3/9/20

LOG OF AUGER HA19

Geotechnical Investigation
597 East Maddisons Road
Faringdon
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 28/08/2020
Hole Depth : 0.2 m
Hole Diameter : 50 mm

Shear Vane No : N/A
Logged By : JC/RB/JW
Reviewed By : JRW
Latitude : 172.38087
Longitude : -43.62172

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0.1	TOPSOIL	ML	SILT with trace sand, gravel and rootlets; brown. Low plasticity [TOPSOIL].				M	St-VSt	
0.2			End of Hole Depth: 0.2 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.2 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered

GEOTECH HAND AUGER 597 EAST MADDISONS ROAD - HA LOGS.GPJ NZ DATA TEMPLATE 2.GDT 3/9/20

LOG OF AUGER HA20

Geotechnical Investigation
597 East Maddisons Road
Faringdon
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 28/08/2020
Hole Depth : 0.2 m
Hole Diameter : 50 mm

Shear Vane No : N/A
Logged By : JC/RB/JW
Reviewed By : JRW
Latitude : 172.38005
Longitude : -43.62137

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0.1	TOPSOIL	ML	SILT with trace sand, gravel and rootlets; brown. Low plasticity [TOPSOIL].				M	St-VSt	
0.2			End of Hole Depth: 0.2 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.2 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered

LOG OF AUGER HA21

Geotechnical Investigation
597 East Maddisons Road
Faringdon
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 28/08/2020
Hole Depth : 0.5 m
Hole Diameter : 50 mm

Shear Vane No : N/A
Logged By : JC/RB/JW
Reviewed By : JRW
Latitude : 172.37925
Longitude : -43.62172

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0.1	TOPSOIL	ML	SILT with trace sand, gravel and rootlets; brown. Low plasticity [TOPSOIL].				M	St-VSt	
0.3	ALLUVIUM	SM	SIlty fine to medium SAND; greyish brown. Poorly graded.					MD	
0.5			End of Hole Depth: 0.5 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.5 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.5 m depth.
Standing groundwater was not encountered

GEOTECH HAND AUGER 597 EAST MADDISONS ROAD - HA LOGS.GPJ NZ DATA TEMPLATE 2.GDT 3/9/20

LOG OF AUGER HA22

Geotechnical Investigation
597 East Maddisons Road
Faringdon
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 28/08/2020
Hole Depth : 0.5 m
Hole Diameter : 50 mm

Shear Vane No : N/A
Logged By : JC/RB/JW
Reviewed By : JRW
Latitude : 172.37934
Longitude : -43.62292

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0.1	TOPSOIL	ML	SILT with trace sand, gravel and rootlets; brown. Low plasticity [TOPSOIL].				M	St-VSt	
0.3	ALLUVIUM	SP	Fine to medium SAND with minor silt; greyish brown. Poorly graded.					MD	
0.5			End of Hole Depth: 0.5 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8

>>

Hand auger met practical refusal at 0.5 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.6 m depth.
Standing groundwater was not encountered

GEOTECH HAND AUGER 597 EAST MADDISONS ROAD - HA LOGS.GPJ NZ DATA TEMPLATE 2.GDT 3/9/20

LOG OF AUGER HA23

Geotechnical Investigation
597 East Maddisons Road
Faringdon
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 28/08/2020
Hole Depth : 0.4 m
Hole Diameter : 50 mm

Shear Vane No : N/A
Logged By : JC/RB/JW
Reviewed By : JRW
Latitude : 172.37975
Longitude : -43.62219

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0.1	TOPSOIL	ML	SILT with trace sand, gravel and rootlets; brown. Low plasticity [TOPSOIL].				M	St-VSt	
0.3	ALLUVIUM	SP	Fine to medium SAND with minor silt; greyish brown. Poorly graded.					MD	
0.4			End of Hole Depth: 0.4 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.4 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.4 m depth.
Standing groundwater was not encountered

GEOTECH HAND AUGER 597 EAST MADDISONS ROAD - HA LOGS.GPJ NZ DATA TEMPLATE 2.GDT 3/9/20

LOG OF AUGER HA24

Geotechnical Investigation
597 East Maddisons Road
Faringdon
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 28/08/2020
Hole Depth : 0.2 m
Hole Diameter : 50 mm

Shear Vane No : N/A
Logged By : JC/RB/JW
Reviewed By : JRW
Latitude : 172.37866
Longitude : -43.62205

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0.1	TOPSOIL	ML	SILT with trace sand, gravel and rootlets; brown. Low plasticity [TOPSOIL].				M	St-VSt	
0.2			End of Hole Depth: 0.2 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.2 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered

GEOTECH HAND AUGER 597 EAST MADDISONS ROAD - HA LOGS.GPJ NZ DATA TEMPLATE 2.GDT 3/9/20

LOG OF AUGER HA25

Geotechnical Investigation
597 East Maddisons Road
Faringdon
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 28/08/2020
Hole Depth : 0.3 m
Hole Diameter : 50 mm

Shear Vane No : N/A
Logged By : JC/RB/JW
Reviewed By : JRW
Latitude : 172.37789
Longitude : -43.6211

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0.1	TOPSOIL	ML	SILT with some sand, trace gravel and rootlets; brown. Low plasticity. Sand, fine [TOPSOIL].				M	St-VSt	
0.2									
0.3			End of Hole Depth: 0.3 m Termination Condition: Practical refusal						
0.4									
0.5									
0.6									
0.7									
0.8									

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.3 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.4 m depth.
Standing groundwater was not encountered

GEOTECH HAND AUGER 597 EAST MADDISONS ROAD - HA LOGS.GPJ NZ DATA TEMPLATE 2.GDT 3/9/20

LOG OF AUGER HA26

Geotechnical Investigation
597 East Maddisons Road
Faringdon
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 28/08/2020
Hole Depth : 0.2 m
Hole Diameter : 50 mm

Shear Vane No : N/A
Logged By : JC/RB/JW
Reviewed By : JRW
Latitude : 172.37891
Longitude : -43.62116

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0.1	TOPSOIL	ML	SILT with trace sand, gravel and rootlets; brown. Low plasticity [TOPSOIL].				M	St-VSt	
0.2			End of Hole Depth: 0.2 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.2 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered

GEOTECH HAND AUGER 597 EAST MADDISONS ROAD - HA LOGS.GPJ NZ DATA TEMPLATE 2.GDT 3/9/20

LOG OF AUGER HA27

Geotechnical Investigation
597 East Maddisons Road
Faringdon
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 28/08/2020
Hole Depth : 0.4 m
Hole Diameter : 50 mm

Shear Vane No : N/A
Logged By : JC/RB/JW
Reviewed By : JRW
Latitude : 172.37915
Longitude : -43.62042

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0.1	TOPSOIL	ML	SILT with trace sand, gravel and rootlets; brown. Low plasticity [TOPSOIL].				M	St-VSt	
0.3	ALLUVIUM	SP	Fine to medium SAND with minor silt; greyish brown. Poorly graded.					MD	
0.4			End of Hole Depth: 0.4 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8

>>

Hand auger met practical refusal at 0.4 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.6 m depth.
Standing groundwater was not encountered

GEOTECH HAND AUGER 597 EAST MADDISONS ROAD - HA LOGS.GPJ NZ DATA TEMPLATE 2.GDT 3/9/20

LOG OF AUGER HA28

Geotechnical Investigation
597 East Maddisons Road
Faringdon
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 28/08/2020
Hole Depth : 0.2 m
Hole Diameter : 50 mm

Shear Vane No : N/A
Logged By : JC/RB/JW
Reviewed By : JRW
Latitude : 172.38012
Longitude : -43.62061

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Scala Penetrometer Blows per 100mm
0.1	TOPSOIL	ML	SILT with trace sand, gravel and rootlets; brown. Low plasticity [TOPSOIL].				M	St-VSt		
0.2			End of Hole Depth: 0.2 m Termination Condition: Practical refusal							>>

Hand auger met practical refusal at 0.2 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.2 m depth.
Standing groundwater was not encountered

GEOTECH HAND AUGER 597 EAST MADDISONS ROAD - HA LOGS.GPJ NZ DATA TEMPLATE 2.GDT 3/9/20

LOG OF AUGER HA29

Geotechnical Investigation
597 East Maddisons Road
Faringdon
12903

Client : Hughes Developments Ltd
Client Ref. : N/A
Date : 28/08/2020
Hole Depth : 0.2 m
Hole Diameter : 50 mm

Shear Vane No : N/A
Logged By : JC/RB/JW
Reviewed By : JRW
Latitude : 172.37978
Longitude : -43.62013

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0.1	TOPSOIL	ML	SILT with trace sand, gravel and rootlets; brown. Low plasticity [TOPSOIL].				M	St-VSt	
0.2			End of Hole Depth: 0.2 m Termination Condition: Practical refusal						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.2 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered

GEOTECH HAND AUGER 597 EAST MADDISONS ROAD - HA LOGS.GPJ NZ DATA TEMPLATE 2.GDT 3/9/20

APPENDIX 3:

ECan Borelogs

Bore or Well No	M36/4346
Well Name	CNR MADDISONS & GOULDS RDS
Owner	MAIN M.R.

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

Well Number	M36/4346	**File Number**	
Owner	MAIN M.R.	**Well Status**	Active (exist, present)
Street/Road	CNR MADDISONS & GOULDS RDS	**NZTM Grid Reference**	BX23:49967-69900
Locality	ROLLESTON	**NZTM X and Y**	1549967 - 5169900
Location Description		**Location Accuracy**	50 - 300m
CWMS Zone	Selwyn - Waihora	**Use**	Domestic Supply,
Groundwater Allocation Zone	Selwyn-Waimakariri	**Water Level Monitoring**	--
Depth	26.80m	**Water Level Count**	0
Diameter	150mm	**Initial Water Level**	
Measuring Point Description		**Highest Water Level**	
Measuring Point Elevation	39.12m above MSL (Lyttelton 1937)	**Lowest Water Level**	
Elevation Accuracy	< 2.5 m	**First reading**	
Ground Level	0.00m above MP	**Last reading**	
Strata Layers	15	**Calc Min 80%**	9.71m below MP (Estimated)
Aquifer Name	Riccarton Gravel	**Aquifer Tests**	0
Aquifer Type	Unknown	**Yield Drawdown Tests**	1
Drill Date	01 Apr 1991	**Max Tested Yield**	6 l/s
Driller	Dynes Road Drilling	**Drawdown at Max Tested Yield**	5 m
Drilling Method	Cable Tool	**Specific Capacity**	1.33 l/s/m
Casing Material	STEEL	**Last Updated**	08 Nov 2013
Pump Type	Unknown	**Last Field Check**	
Water Use Data	No		

Borelog for well M36/4346

Grid Reference (NZTM): 1549968 mE, 5169901 mN
Location Accuracy: 50 - 300m
Ground Level Altitude: 39.1 m +MSD Accuracy: < 2.5 m
Driller: Dynes Road Drilling
Drill Method: Cable Tool
Borelog Depth: 28.5 m Drill Date: 01-Apr-1991

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

Scale(m)	Water Level	Depth(m)	Full Drillers Description	Formation Code
		4.00m	Not logged	RI
5		6.00m	Large to medium gravel, small amount of silt	RI
		8.00m	Silt	RI
		11.50m	Gravel and silt	RI
10		14.00m	Very tight clay, small shingle	RI
		16.00m	Tight clay and shingle	RI
15		18.00m	Tight clay, small gravel	RI
		18.50m	Clay and gravel, not as tight	RI
		19.00m	Gravel, some water	RI
		21.00m	Tight clay gravel	RI
20		22.00m	Tight clay and small to medium gravel, some amount of water	RI
		24.00m	Open medium gravel	RI
		26.00m	Small to medium gravel	RI
25		28.00m	Small gravel	RI
		28.50m	Grey silt with wood	BR

Bore or Well No	M36/4891
Well Name	CNR MADDISONS & GOULDS ROAD
Owner	Mr & Ms B N & J A Stevens & Gray

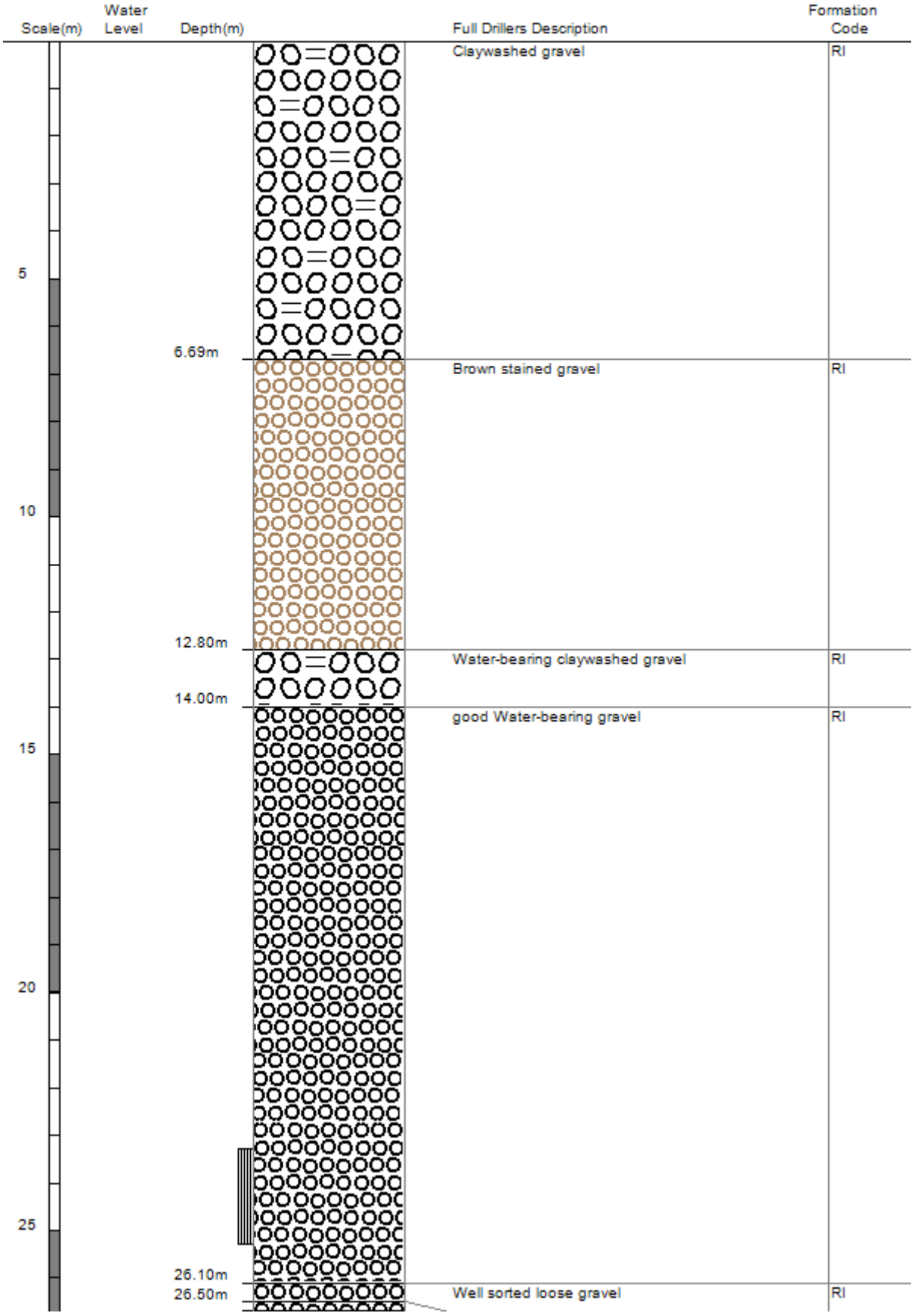
Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

Well Number	M36/4891	**File Number**	CO6C/06015
Owner	Mr & Ms B N & J A Stevens & Gray	**Well Status**	Active (exist, present)
Street/Road	CNR MADDISONS & GOULDS ROAD	**NZTM Grid Reference**	BX23:50117-70000
Locality	ROLLESTON	**NZTM X and Y**	1550117 - 5170000
Location Description		**Location Accuracy**	50 - 300m
CWMS Zone	Selwyn - Waihora	**Use**	Domestic and Stockwater,
Groundwater Allocation Zone	Selwyn-Waimakariri	**Water Level Monitoring**	--
Depth	25.25m	**Water Level Count**	0
Diameter	150mm	**Initial Water Level**	7.38m below MP
Measuring Point Description		**Highest Water Level**	
Measuring Point Elevation	39.15m above MSL (Lyttelton 1937)	**Lowest Water Level**	
Elevation Accuracy	< 2.5 m	**First reading**	
Ground Level	0.00m above MP	**Last reading**	
Strata Layers	6	**Calc Min 80%**	9.81m below MP (Estimated)
Aquifer Name	Riccarton Gravel	**Aquifer Tests**	0
Aquifer Type	Unknown	**Yield Drawdown Tests**	1
Drill Date	05 May 1995	**Max Tested Yield**	8 l/s
Driller	Clemence Drilling Contractors	**Drawdown at Max Tested Yield**	4 m
Drilling Method	Unknown	**Specific Capacity**	2.25 l/s/m
Casing Material	UNKNOWN	**Last Updated**	08 Nov 2013
Pump Type	Unknown	**Last Field Check**	
Water Use Data	No		

Borelog for well M36/4891

Grid Reference (NZTM): 1550118 mE, 5170001 mN
Location Accuracy: 50 - 300m
Ground Level Altitude: 39.2 m +MSD Accuracy: < 2.5 m
Driller: Clemence Drilling Contractors
Drill Method: Unknown
Borelog Depth: 26.7 m Drill Date: 05-May-1995

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha



Bore or Well No	M36/5041
Well Name	DUNNS CROSSING ROAD
Owner	KAJENS TRADING DEVELOPMENT LTD

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

Well Number	M36/5041	**File Number**	CO6C/10302
Owner	KAJENS TRADING DEVELOPMENT LTD	**Well Status**	Active (exist, present)
Street/Road	DUNNS CROSSING ROAD	**NZTM Grid Reference**	BX23:49507-69990
Locality	ROLLESTON	**NZTM X and Y**	1549507 - 5169990
Location Description		**Location Accuracy**	50 - 300m
CWMS Zone	Selwyn - Waihora	**Use**	Domestic Supply,
Groundwater Allocation Zone	Selwyn-Waimakariri	**Water Level Monitoring**	--
Depth	32.00m	**Water Level Count**	0
Diameter	150mm	**Initial Water Level**	6.80m below MP
Measuring Point Description		**Highest Water Level**	
Measuring Point Elevation	40.47m above MSL (Lyttelton 1937)	**Lowest Water Level**	
Elevation Accuracy	< 2.5 m	**First reading**	
Ground Level	0.00m above MP	**Last reading**	
Strata Layers	10	**Calc Min 80%**	9.73m below MP (Estimated)
Aquifer Name		**Aquifer Tests**	0
Aquifer Type	Unknown	**Yield Drawdown Tests**	1
Drill Date	01 Feb 1997	**Max Tested Yield**	5 l/s
Driller	Dynes Road Drilling	**Drawdown at Max Tested Yield**	13 m
Drilling Method	Cable Tool	**Specific Capacity**	0.40 l/s/m
Casing Material	STEEL	**Last Updated**	08 Nov 2013
Pump Type	Unknown	**Last Field Check**	
Water Use Data	No		

Screens

Screen No.	Screen Type	Top (m)	Bottom (m)	Slot Size (mm)	Slot Length (mm)	Diameter (mm)	Leader Length (mm)
1	Stainless steel	30	32				

Step Tests

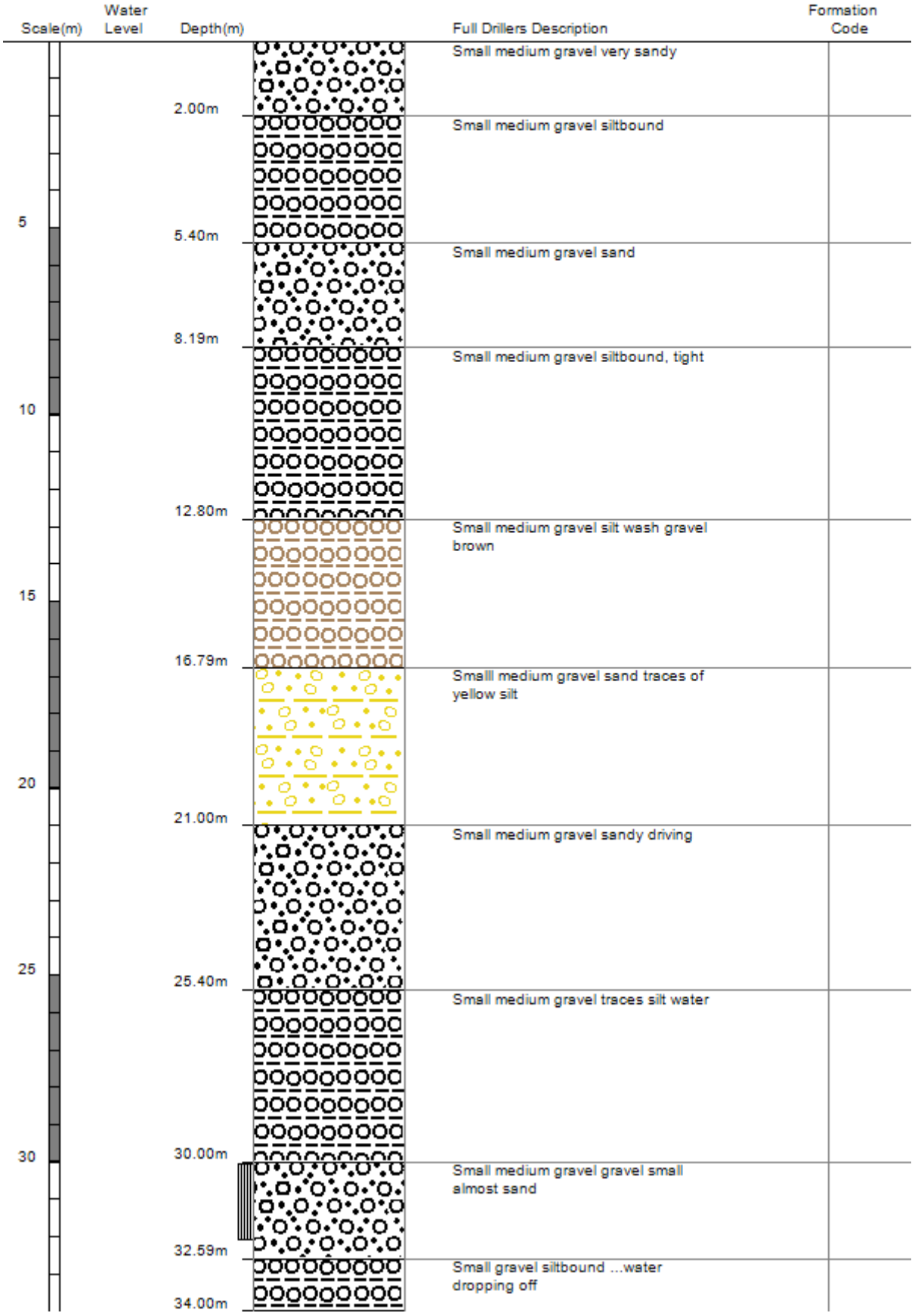
Step Test Date	Step	Yield	Yield GPM	DrawDown	Step Duration
01 Feb 1997	1	5.1	67.31074	12.8	2

No comments for this well

Borelog for well M36/5041

Grid Reference (NZTM): 1549508 mE, 5169991 mN
Location Accuracy: 50 - 300m
Ground Level Altitude: 40.5 m +MSD Accuracy: < 2.5 m
Driller: Dynes Road Drilling
Drill Method: Cable Tool
Borelog Depth: 34.0 m Drill Date: 01-Feb-1997

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha



Bore or Well No	M36/4449
Well Name	DUNNS CROSSING RD
Owner	TYACK GJ & FR

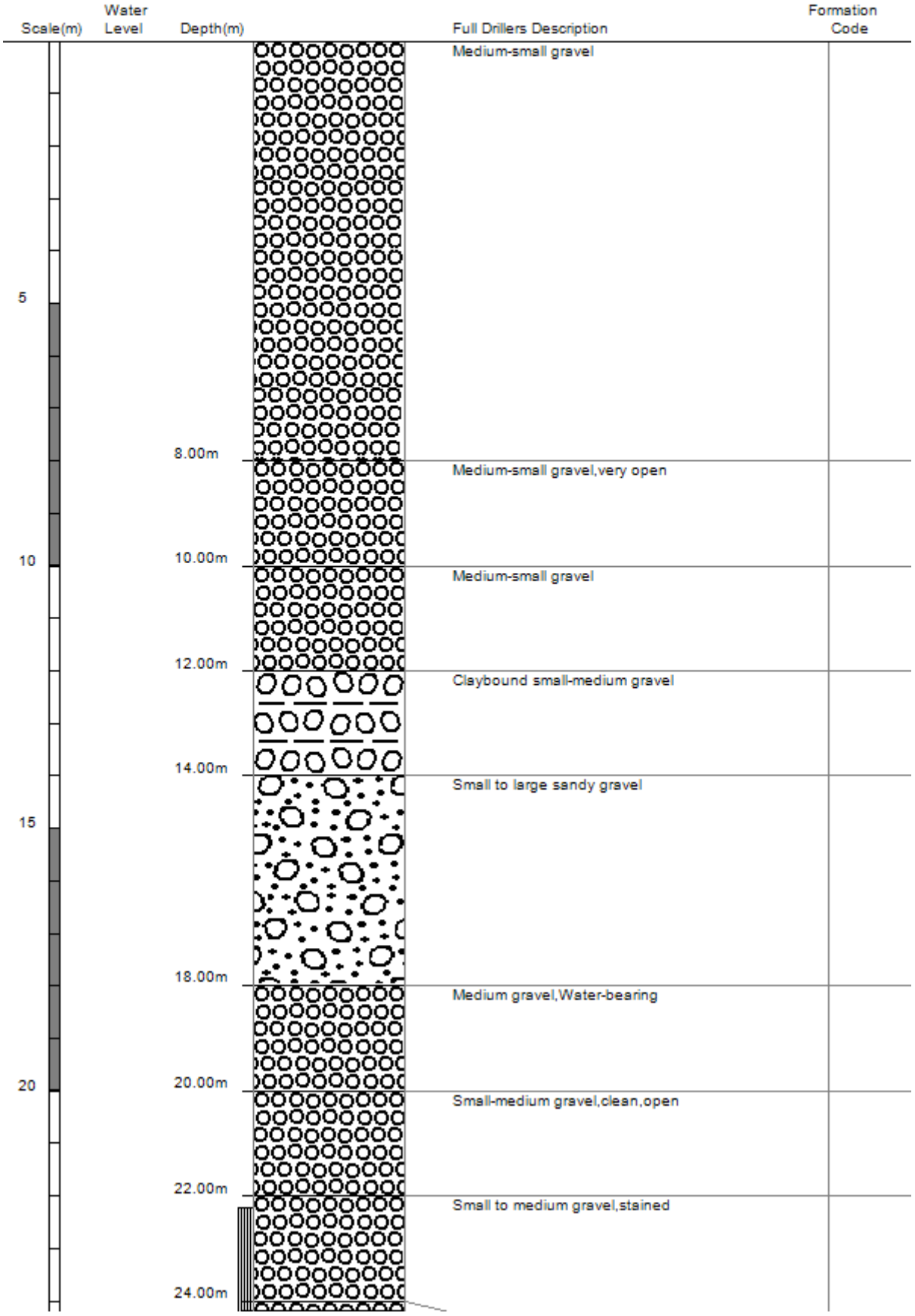
Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

Well Number	M36/4449	**File Number**	CO6C/02046
Owner	TYACK GJ & FR	**Well Status**	Not Used
Street/Road	DUNNS CROSSING RD	**NZTM Grid Reference**	BX23:49508-69470
Locality	ROLLESTON	**NZTM X and Y**	1549508 - 5169470
Location Description	LOT 1	**Location Accuracy**	50 - 300m
CWMS Zone	Selwyn - Waihora	**Use**	Irrigation,
Groundwater Allocation Zone	Selwyn-Waimakariri	**Water Level Monitoring**	--
Depth	24.20m	**Water Level Count**	0
Diameter	150mm	**Initial Water Level**	
Measuring Point Description		**Highest Water Level**	
Measuring Point Elevation	38.81m above MSL (Lyttelton 1937)	**Lowest Water Level**	
Elevation Accuracy	< 2.5 m	**First reading**	
Ground Level	0.00m above MP	**Last reading**	
Strata Layers	9	**Calc Min 80%**	9.27m below MP (Estimated)
Aquifer Name	Riccarton Gravel	**Aquifer Tests**	0
Aquifer Type	Unknown	**Yield Drawdown Tests**	1
Drill Date	09 Jun 1992	**Max Tested Yield**	6 l/s
Driller	Dynes Road Drilling	**Drawdown at Max Tested Yield**	5 m
Drilling Method	Cable Tool	**Specific Capacity**	1.36 l/s/m
Casing Material		**Last Updated**	08 Nov 2013
Pump Type	Unknown	**Last Field Check**	
Water Use Data	No		

Borelog for well M36/4449

Grid Reference (NZTM): 1549508 mE, 5169471 mN
Location Accuracy: 50 - 300m
Ground Level Altitude: 38.8 m +MSD Accuracy: < 2.5 m
Driller: Dynes Road Drilling
Drill Method: Cable Tool
Borelog Depth: 24.2 m Drill Date: 09-Jun-1992

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha



Bore or Well No	M36/7512
Well Name	East Maddisons Road
Owner	Mr & Mrs A S & M M Baxter

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

Well Number	M36/7512	**File Number**	CO6C/21054
Owner	Mr & Mrs A S & M M Baxter	**Well Status**	Active (exist, present)
Street/Road	East Maddisons Road	**NZTM Grid Reference**	BX23:50237-69431
Locality	Rolleston	**NZTM X and Y**	1550237 - 5169431
Location Description		**Location Accuracy**	50 - 300m
CWMS Zone	Selwyn - Waihora	**Use**	Domestic and Stockwater,
Groundwater Allocation Zone	Selwyn-Waimakariri	**Water Level Monitoring**	--
Depth	29.00m	**Water Level Count**	0
Diameter	150mm	**Initial Water Level**	8.10m below MP
Measuring Point Description		**Highest Water Level**	
Measuring Point Elevation	34.85m above MSL (Lyttelton 1937)	**Lowest Water Level**	
Elevation Accuracy	< 5 m	**First reading**	
Ground Level	0.00m above MP	**Last reading**	
Strata Layers	6	**Calc Min 80%**	9.32m below MP (Estimated)
Aquifer Name		**Aquifer Tests**	0
Aquifer Type		**Yield Drawdown Tests**	2
Drill Date	01 Dec 2003	**Max Tested Yield**	5 l/s
Driller	Dynes Road Drilling	**Drawdown at Max Tested Yield**	10 m
Drilling Method	Cable Tool	**Specific Capacity**	0.41 l/s/m
Casing Material	STEEL	**Last Updated**	08 Nov 2013
Pump Type		**Last Field Check**	
Water Use Data	No		

Screens

Screen No.	Screen Type	Top (m)	Bottom (m)	Slot Size (mm)	Slot Length (mm)	Diameter (mm)	Leader Length (mm)
1	Stainless steel	27	29				

Step Tests

Step Test Date	Step	Yield	Yield GPM	DrawDown	Step Duration
01 Dec 2003	1	1.5	19.7972755	3.65	2
01 Dec 2003	2	4.9	64.6711044	10.36	3

No comments for this well

Borelog for well M36/7512

Grid Reference (NZTM): 1550238 mE, 5169431 mN
Location Accuracy: 50 - 300m
Ground Level Altitude: 34.9 m +MSD Accuracy: < 0.5 m
Driller: Dynes Road Drilling
Drill Method: Cable Tool
Borelog Depth: 29.0 m Drill Date: 01-Dec-2003

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha